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THE

EXISTENCE

OF

OTHER WORLDS,

PEOPLED WITH

LIVING AND INTELLIGENT BEINGS,

DEDUCED FROM THE NATURE OF THE UNIVERSE.

To which is added,

MODERN DISCOVERIES AND TIMES CONTRASTED WITH THE
STATE OF KNOWLEDGE OF THE ANCIENT EGYPTIANS.

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ST. PAUL'S CHURCHYARD, AND WATERLOO PLACE, PALL MALL.
EDINBURGH: WILLIAM WHYTE & CO.

1834.

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INTRODUCTORY REMARKS.

> "Is this extravagant? No, this is just;
> Just in conjecture, though 'twere false in fact.
> If 'tis an error, 'tis an error sprung
> From noble root; high thought of the MOST HIGH;
> But wherefore error?—Who can prove it such?
>
> YOUNG.

I WAS taught from my childhood to believe in *a plurality of worlds* by One whose opinion was the result of many years telescopic observation of the heavens. When I came to understand the magnifying powers of those instruments to which modern astronomy is so deeply indebted for the advances it has made towards a knowledge of the visible universe, and had attentively observed the distant globes of the sky with the assistance of these wonderful inventions, I became fully convinced of the very great *probability* of such vast bodies being inhabited by some race of Beings, or, more likely, by many distinct orders and natures of them. I saw that the shining wonders of the firmament were worlds *in size*, beyond all question, although scientific men may differ in some degree on several immaterial points, such as the exact diameters of a few of the smaller and latest-discovered planets. Personal observations showed me that there were some great features of resemblance between our earth and the planets which we see in constant motion in their appointed paths. I looked in vain for any mark of pre-eminence in the situation of the earth, and was even obliged to admit that it is greatly inferior in magnitude to several of its fellow-planets circling round the Sun in nearly the same plane with itself. I was sensible that the light of the Sun which falls on the earth must have been intended by its Divine Creator for the use of the inhabitants of the latter. Nothing can be more clear than that the eyes of all animals are expressly contrived to receive and benefit by its rays, which convey a knowledge of visible things to their possessors; being, in fact, absolutely necessary for animal life in general, constituted as it is;—*colour* also entirely depending upon light. I saw that the same great source of light which illuminates the earth, likewise extends its rays to all the other planets; and that the comparatively small bodies, which, like our moon, revolve round most of them, are apparently also moons, whose light, and that which comes to them direct from the Sun, I could not naturally suppose to be without a beneficial end, or intended only to enlighten vast and useless wastes. I saw the planets holding their annual courses, and revolving on their axes like the earth; consequently, that they must have different seasons, with day and night. A single glance at the nearest of what are sometimes denominated the *heavenly bodies*, through such a tube, for instance, as Ramage's great reflecting telescope, would convince even the most sceptical that he saw mountains, plains, and valleys, on the globe he was examining; and, without any artificial assistance at all, we see that the body alluded to is of a diversified surface. But I must not here anticipate further what shall be minutely treated of in the ensuing pages. These, I may mention, although the information is immaterial to the present inquiry, originated in an investigation which I made previous to assuming in another publication that there are many other worlds in space besides our own, and that, in fact, all the Stars we see around the earth are habitations for creatures possessing life; formed, of course, by the same Creator as ourselves. It will be seen, I hope, by every one, that I proceeded on no mere fanciful grounds, or without due and serious consideration of the Scriptures, of astronomical facts, and of the common inferences proceeding from them. Let those who entertain a contrary opinion, take equal pains, to discover what is really known with tolerable certainty in regard to the Stars, before they hold themselves entitled to dispute the conclusions at which so many scientific men, whose writings I shall cite, have arrived at, ***and not till then.***

The present work pretends to little originality, but it must be reckoned greatly more valuable and convincing than if it had been entirely original. Such a collection of opinions on the subject of which it treats, with reviews of the astronomical observations on which these ideas were founded, has never yet been published; nor, indeed, has any work with which

I am acquainted discussed this question exclusively, or with that degree of attention and impartiality which it merits. I have not referred merely to those opinions and reasonings of others which I found agreeable to the belief that I wished to support, for it is by a consideration of both, that we may make the nearest approach to the truth. A solitary opinion in regard to our present subject in an astronomical work may occasionally meet the eye; but, though it surpasses in importance and magnificence of conception any other point in the science of astronomy, it seems to be commonly passed over as an idea to which little attention need be directed, or else it is assumed without the reasons for its adoption being sufficiently explained.*

I intend to bring together under one view all the rational and philosophic reasons which can now be given for believing either that the fixed stars or the planets are habitations for living beings, and to refer to the writings of those learned men who have thought so, with the grounds of their belief as stated in their own words. In this age of rapidly-advancing knowledge, I trust that my endeavours to contribute to the *march of intellect* will be acceptable; and, besides enlarging our ideas of the sublime grandeur of the sight which every clear night presents to us,—open up, however imperfectly, to our mind's eye, the amazing and delightful scenes which a future life may discover to us, when, as favoured servants of God, we may, by his permission, range among the wonders of his creation, or, as messengers of his will, carry his commands to some distant world; in like manner as we read that it was usual for angels to be employed, and, no doubt, is so still.*

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* In Mitchell's Elements of Astronomy there is an Essay expressly on this subject; so that work, in a great measure, forms an exception to the above remark.

It might be asked, in the first place,—what reasons can there be *for disbelieving* in such a notion, and who are those whose knowledge entitle their opinions to respect, who think it either impossible or improbable,—asserting that in the vast universe of God there can exist no world in the least degree similar to that one on which we live. These questions would be far more difficult to be satisfactorily answered than those here undertaken,

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* There are expressions in the Scriptures which speak of *the Stars falling* at the last day, which some have imagined ought to be interpreted *literally*, and as actually referring to the fixed Stars, and also to the Planets of the solar system! It would occupy too much space here to show from the Scriptures themselves the absurdity of such an interpretation of Holy Writ, which, in its usual

The inquiry may be considered not one of mere unprofitable curiosity, but of deep interest, and I hesitate not to acknowledge that, after the most impartial consideration of all we have yet discovered, and aided by the best instruments, I concur in the high degree of probability of the truth contended for by the many eminent men to whom I shall appeal. For my own part, I may go a step farther, and add, that I have no doubts remaining on the subject of the

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figurative language, often alludes to the great men of the earth under the name or similitude of Stars; a figure of speech common to this day among ourselves, and probably derived from this source. In the instances referred to in the Scriptural writings, it is perfectly plain from a due comparison of different passages there, that the sublunary sense above given to the phrase is the true one. See "*Mortal Life, and the State of the Soul after Death,*" p. 541 et seq.

general fact, caring little for the ridicule which ignorance may attempt to throw upon the following investigation. I have now a literary work before me which styles a belief in such other worlds "an idle speculation of some grossly enthusiastic and not unfrequently stupid astronomer"—"an airy dream—imaginary realities,"—and "calculated to lead superficial and unthinking minds astray." The same writer stigmatizes as "*quackery in science*," the sublime theories and belief of many of the ablest observers of the heavens and most pious divines, whom he complains of being listened to, while "the modest, the unassuming, and the intelligent," (by which terms he seems to characterise such as himself) "are too often cast into the shade."—But the secret of this author's unbelief (and it is not a singular one) escapes in the very same page, for he affirms that "the knowledge of astronomy requisite to determine the question is confined to a very small compass." We can have no doubt that *his own* lies within similar limits; for, although his research has evidently been extensive among a certain class of writers, yet it seems plainly to have been guided entirely by a wish to discover only whatever might tend to support his own assertions.*

Rolls this world of ours, then, the sole inhabited globe in the immensity of space? or is it even the only peopled scene of intelligent existence among the thousand of shining globes which we see around us on all sides? Is that man really a mere visionary who believes that the ball he stands upon holds no such exclusive rank in point of size and in being a habitation for life as some would assign to it,—who considers that it has no such pre-eminent importance in wonderful and varied workmanship; in animal, mineral and vegetable creations over other planetary bodies of our system? He who knows scarcely more of astronomy than what his naked eye can inform him, or rather *seems* to show him, readily answers by smiling at the idea with a fancied superiority of wis-

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* On the first announcement of this work about a year ago, in another which I then published, a Critic in "the Presbyterian Review and Religious Journal" (an Edinburgh periodical) beseeches the author to suppress it, because "*its title is strange and extravagant in itself.*" So acute and foreseeing is this Reviewer, judging of a Book from the title-page, that he condemns without reading it; fancying nothing can be sound beyond the limits of his own philosophy. It is too common to *review* thus from a glance at the Title and Table of Contents, which mode this critic seems to be guided by on other occasions; but, as I wish, in so far, to conciliate his pen, in case of being a second time honoured by his notice, I beg to apologize for not following his advice. I hope, at the same time, that he will not again, at least, criticise an expression as if used by me in my simplicity, when I am merely finding fault *with another for it* in an express quotation; for such disingenuousness is not admired, particularly from a writer in a religious

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Journal. One who professes not to understand what can be implied by the very title of "*Mortal Life, and the State of the Soul after Death*," ought to have been cautious how he exposed himself with such inconsistent opinions as he ventures. I should, however, thank him for the highly-complimentary encomiums with which he commences, and feel particularly gratified at the repeated (though apparently-reluctant) admissions by this organ of the Presbyterian Church of "*the soundness of* the *main idea*," in the work just named,—*the doctrine of a middle State*, as therein explained. I leave him to reconcile his charge of my having made "by no means profound research," with his admission of the author having, at the same time, "traversed the whole circuit of theology, physiology, and metaphysics." He has the candour, however, to acknowledge that a reference to and quotations from considerably above two hundred of the most eminent writers is "*rather extensive research*."

dom, wondering how any man could be led to entertain what *to him* appears so plainly impossible, without, at the same time, thinking it necessary to give a single reason against such a belief; but the philosophic inquirer investigates the *data* on which astronomers build this exalted belief of the power of God.

Although it may not be a knowledge essentially necessary, or directly benefiting us, yet it is assuredly a question which ought to interest us with a rational curiosity, to learn if there be other earths as well adapted for supporting life as our own. That their inhabitants are men like ourselves, or animals such as we see, and these worlds exactly similar in any one respect to that we are upon, are points of resemblance no more necessary to their real existence than that Britain should resemble in the features of its land and its vegetation an island in the Indian seas, or that its people should also have the same features and appearance.* Those who hold the opinion of there being other worlds, teeming with life, experiencing cold and warmth, day and night, have been called credulous; because they have not been able directly to *prove* the truth of all that they see reason to believe. Is this fair? Is the strongest *probability*, if it can be shown, to be scorned, because the evidence of absolute demonstration, of seeing and feeling as to some points, is wanting? We do not carry this principle so far in other matters, but frequently credit what can be rendered extremely likely to be the case,

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* "We have no personal knowledge that there are any Beings in existence besides ourselves; but this is no reason for our denying or disbelieving that there are any."—"The planets, which move

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like ourselves round the sun, and the stationary stars, which seem like suns themselves, are sensible proofs that material worlds exist, on which sentient or intelligent Beings may live, as we do here; and it is more reasonable to suppose that they are occupied by such, than that they are mere brute" (or rather inanimate) "substances, vacant of all life and feeling. No educated mind, therefore, can doubt, that the universe is replenished with as many spheres of animated Beings, as there are radiant or reflecting orbs for their abodes. But it does not at all follow, from the certainty of their existence, that they are, in spirit and intellect, and therefore in the power which results from mental capacity, of a superior order to ourselves."—*Turner's Sacred Hist. of the World.* Pp. 497–8.

which is all that is now attempted to be established in the following pages.

The probability of a plurality of worlds is now commonly taught in those elementary books for youth which relate to the system of the universe, though, as before observed, seldom at greater length than a bare statement, with a fact or two mentioned in a few words from which it may be inferred. It is time for this belief to be fully explained; as one consequence of only a few sentences on the subject too often is, that the first person who endeavours to invalidate the idea as an absurd one, is believed, and the young mind then wonders at its own simplicity and easy credulity. Remembering, however, the authority which first induced it to credit the doctrine, it becomes sadly shaken in its dependence on the truth of many other things which it gave credit to in like manner.

The belief is expressed by so many authors, that it may be thought unnecessary to refer to the writings of such a number as is done in the present work, but as they all vary in their manner of reasoning on this belief, and as some more plainly than others deduce the inferences they draw from the same facts, I should hope their own words will both entertain and instruct my readers, and ought to carry conviction to our minds more satisfactorily than if all the arguments used by the whole of them had been given by any one writer, however high his reputation.

I have taken advantage of the opportunity afforded by this volume, for allowing a few lightly-written pages to *come out* under its protection. They are principally intended to illustrate the difference between the ancient and modern degrees of knowledge in general, and the surprise which some of our most important discoveries would naturally create in the mind of an Egyptian of the time of the Pharaohs, were such a one to return to view this lower world, and to be made acquainted with what we can now do and tell; supposing (which, however, I admit would be very improbable) that such a one had made no mental acquisitions in the interval, and had not become acquainted with any thing that had been going on here. Though the trifles to which I refer may not be allowed to be exactly in their proper place, yet they may serve to amuse after more abstruse studies, and in some passages they are not unconnected with the more important inquiries of this work;—so I take the liberty, with all becoming diffidence, of introducing them to the notice of my "gentle readers."

ALEX. COPLAND.

January 1*st*, 1834.

those who study with a view to become acquainted with those attributes of the Almighty which are so evidently displayed in his handiworks, and these, the more they are observed, the more do they tend to raise our conceptions of his exalted nature. The Volume now alluded to has been called THE BOOK OF NATURE, and includes the wondrous works around us on the earth as well as in the sky.

Its study is repeatedly recommended in the second, which we denominate THE BIBLE, or the revealed rules for the government of earthly beings, and written by penmen inspired by a Superior Power. They often break out into sublime strains of adoration on beholding the works of God, which they declare ought to be sought out by all those who have pleasure therein; and none seem to have filled them with more astonishing and magnificent conceptions of the unlimited power of a divine Architect than the Sun, Moon, and Stars.

There are some who have thought to show either their learning or their zeal for religion by pointing out seeming differences between certain passages in the inspired Record and the discoveries of philosophy.

These two sources of our knowledge are alternately, one or other, descried or exalted according to the feelings of different persons. Those little acquainted with the first are they who are most apt to doubt or to deride what it would teach, while the philosopher who neglects the second may fall into even more dangerous error.

No greater proof can be given of the superiority of modern learning than the increasing ability it furnishes us with for proving that the Scriptures agree with, and, in some points, confirm, in a greater or less degree, those explanations of many of the secrets of nature (long hid from the inhabitants of the earth) which philosophy, by the permission of the God of nature, has disclosed to us in these later times. It is only comparatively of yesterday that we were able to know with any certainty, the very shape of the earth we live on, or the extent and general structure of the solar system, with the great laws by which it seems to be directed in its movements. But our system forms only a small part of the visible universe; and the visible, most probably, is but a mere portion of the (to us) invisible creation of stars. The stars! what are they? and what are those less but still immense bodies which describe revolutions round the same centre as our globe?

There are two maxims, the one of Pagan, and the other of Christian authority, which have been often urged in discouragement of such questions as the one we are now about to discuss. "*Quæ supra nos nihil ad nos*" would effectually repress all such inquiries; but I feel no inclination to allow this dictate to have any weight with me, characterised too as it has been by the learned Bishop Bull on a similar difficulty, as "the common shelter of dullness, stupidity, and negligence."

The other maxim I refer to is, that "*we ought to respect the silence of the Scriptures,*" and to this more deference is due; but, waiving at present other objections to being guided by it, there is one preliminary question here, the answer to which we ought to ascertain before we proceed to argue on the propriety of following this advice. It is—whether Scripture is *really* silent on the point? I am of opinion that it is not; and although the light it gives regarding the idea be dim, yet its language and the truths it conveys may now be better understood than in former days. Some have scrupled not to affirm that Holy Writ goes the length of shewing the impossibility of such a belief having any foundation in reality, but this is still further from being the case.

I do not agree with the opinion of the poet who says,

> "Through worlds unnumbered though the God be known,
> 'Tis ours to trace him only in our own."

We can plainly trace a Divinity in every orb above us, for none but an all-powerful hand, guided by wisdom beyond our conception, could have either formed them or could keep them moving with the nicest regularity in their places or paths. Astronomy shews us that every individual star and planet is in some respect different from another, preserving still a general resemblance, and evidently directed in a great measure by the same common laws. The more minutely they are examined, the more does this become evident. Their sizes, their respective brilliancy, their distances, their colour, all are different when surveyed by the telescope, while these differences are more apparent among the planets, seemingly only because we are enabled from their greater proximity to see them better.

Our view of the universe, considered as consisting of numbers of inhabited systems of worlds, has been entertained from the very earliest antiquity, and almost as soon as men began to direct their attention towards the heavenly globes and their motions. It is thus spoken of in several writings which have come down to us, with the first recorded opinions on the point; a few of them referring to the days of ancient Egypt and to the knowledge of its priests. Even *our* eyes may read, in some degree, the extent of their learning and observations in astronomy, as traced by their own hands on the granite of their monuments, and their country is admitted to have been the nursery of science. The most distinguished men of Greece, and afterwards of Italy in its most classic periods, used to finish their studies in the Egyptian temples, where only learning was to be derived, if sought at its most celebrated fountains. The poet Orpheus speaks in some verses of mountains and towns in the moon.* The most enlightened of the ancient sects of philosophic teachers, the Pythagoreans, could not contemplate the order of the works of creation, slightly as many of them were then understood, without believing that there must exist other worlds in distant space than the one given to man for a temporary sojourn.†

Anaximander, a Grecian, to whom tradition ascribes the invention of the celestial Globe, also cherished the same ideas. Anaximines, his scholar, likewise rendered himself eminent by inculcating them.‡ To these may be added Xenophanes, Leucippus, Anaxgoras, and Democritus. A disciple of the latter, named Metrodorus is said by Plutarch to have observed, that it would not be a greater absurdity to suppose there was only a single blade of grass in a distant field, than that there was but one world in the immense or boundless regions of the universe. The Epicurean philosopher and poet Lucretius, in his *De Rerum Natura*, after considerable length of argument to prove a plurality of worlds, thus deduces from it, according to the translation of Mr. Creech :—

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* Plut. de Placit. Phil. L. II. c. 13.—Euseb. Prep. Evang. L. XV. c. 30,—La Lande Art. 302.

† Plutarch de Placit. Phil. L. II. c. 50.

‡ Stobæus Ecl. Phys. L. IX.—Lactantius de Falsa Sapientia L. III. c. 23.

> "It plainly follows, that there must arise
> Distinct and numerous worlds, earth, men, and skies,
> In places distant and remote from this." *

From Seneca we learn that some of the Stoic philosophers believed the Sun itself to be inhabited; † and the popular belief in the times in which they flourished of the existence of many orders of spiritual and other beings differing in their nature from mankind, left them at no loss in allowing every kind of world to have a different sort of inhabitants.

During these middles ages, in which almost the darkness of oblivion fell on all European learning, or clouded its truth by superstition and fanaticism, the higher orders with their followers despised every species of knowledge which had no relation to the science or practice of war; and astronomical investigations degenerated into astrology. The only observations of the heavenly worlds were then made for the purposes of delusion, by designing men, generally more rogues than fools, for the pretended calculations of nativities or destinies, which by some wild imaginings were held to be ruled and influenced by the stars! Traces of this superstition still remain; but a disbelief in the facts which the more rational inquiries disclose, or make probable, is fast wearing away.

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* Lib. II. 1033—1085. of the original.

† Lactantius de Falsa Sapientia L. III. c. 23.

The philosophers of old times had such notions about the nature of other worlds, their substances and condition, that *all* their ideas are not much worth repeating. They had also such an obscure manner of expressing their real sentiments as to natural appearances, and as to all astronomical phenomena, that we often cannot arrive at their exact meaning, which they only explained to their scholars; and many of their doctrines and beliefs are not, in reality, so very far from truth as we are apt on some points to imagine them. However wild some of the fancies may be now considered which were entertained by the ancients concerning the heavenly bodies, that they had in some instances a true notion of what we call *a plurality of worlds* may be collected from the well-known story of Alexander recorded by Valerius Maximus, who, being told that Democritus held an infinity of worlds, is said to have exclaimed, "*Heu me miserum! quod ne* UNO *quidem adhuc potius sum!*" *

Plutarch informs us that the heathens, when they were charged with the worshipping of gods whose tombs they showed on earth, always alleged that the souls of these gods were, nevertheless, in the stars, which they believed to be celestial dwellings. We have no account *when* such ideas of the stars began to be entertained; but, as was to be expected, the original and general belief came to have many particular adornments and descriptions added to it regarding these habitations, according as the fancy of some learned sage led him to imagine *might* be the case; in the same way that savage nations, adopting the universal belief of the immortality of the soul and another state after death, have fabled its pleasures and the features of the new country which they shall then inhabit on the other side of their distant mountains.

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* Those who would desire to learn the opinions of the ancient philosophers on this subject may consult *Diogenes Laertius* and *Plutarch de Placitis Philosophorum*. The learned Cudworth, an English divine, in his celebrated work, discusses them at considerable length, and, from some of the absurdities they bring forward, endeavours to throw discredit on the doctrine. These opinions are likewise compared with the modern discoveries and conjectures in an amusing dialogue in the *Pere Regnault's l' Origine Ancienne de la Physique Nouvelle*, in which, while their mistakes are exposed in an entertaining manner, as much consequence is given to their notions as they are entitled to.

The Babylonians, Chaldeans, and the Sabians of a later period, looked upon the stars as the habitations of a species of angels, and some thought the souls of men descended from the stars.* I would not altogether despise such opinions, found to have been current among the heathen nations of remote antiquity; since they may, in some instances, have been derived from divine revelation, made to those who, the Scriptures inform us, were the favoured of God, and may have thence spread to a people unacquainted with their origin, or, in process of time, even as to how they themselves came to adopt them. Several customs and doctrines we find to have been usual in the very earliest times, a knowledge of the truth or propriety of which could only have proceeded from God, and yet no record has come down to us of the original revelation. As, for example, we find Cain and Abel to have been acquainted with the efficacy of sacrifice, and that it was a religious rite acceptable to the Divinity, a fact which man never could have discovered or even imagined of himself.

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* See Cic. Somn. Scip.—Plut. de Placitis Philosophorum—Julius Firmicus.

On the revival of learning, philosophers began to bring every doctrine in natural science to the test of the strictest examination, and they were gradually enabled to do so by the assistance of instruments which their elder brethren would have certainly considered as connected with magic. With these instruments in their hands, and taking advantage of the discoveries of each other, a long list of illustrious moderns have agreed in the idea of there being other worlds in the stars. Among these students of nature may be reckoned Copernicus, Tycho Brahe, Kepler, Galileo, Revelius, Des Cartes, and others, whose writings I shall hereafter notice at some length.

That the apparently small shining points which we see twinkling in the sky through the darkness of night are any of them of a size to be compared with this earth, or suitable for the habitations of beings like ourselves, must naturally, at first, appear to many but as the fancies of a dream. The *reasons*, however, on which such decided disbelief rests are seldom considered necessary to be mentioned, or even to be thought on ; while those to which astronomers refer as leading to the idea are seldom the subject of inquiry, or seriously listened to with an unprejudiced mind.

It is only from the discoveries of modern times that we have been able to support this notion with probable reasons for its truth ; and, as scientific observations on the planets have now shown so many points of resemblance to the earth, the inference was unavoidable, that, being in some material respects similar bodies, and placed in like circumstances, they were all intended for the same purpose as the earth evidently has been—as worlds on which life may exist. Although the absolute verification of this belief cannot be attained without divine revelation, or actually seeing some indications of life on these globes which are the subject of our conjectures, yet the *likelihood* of their existence may be capable of being rendered so strong that we may have the most rational grounds of belief in it.

The discoveries of the telescope have been so wonderful, and have added so much to our knowledge of the solar system and of the innumerable stars among which it is situated, that we can scarcely say what it may not yet disclose to us in a still-further-improved state ; but the facts which it has already established, and which we are now to consider, will lead to far more information than the greatest philosophers of ancient times could have imagined possible for men upon earth to arrive at by any observations of their own.

To imagine that these and the fixed stars were formed for far nobler purposes than to afford a scarce-visible light to the earth (and millions of them affording no light to it at all, being even themselves unseen by the unassisted eye), has been said to contradict the account of Moses, who seems to ascribe this use to them, and alludes to no other; and it has been remarked, that he everywhere expresses himself as if the sun, moon, and the other heavenly bodies, were nothing more than ministers to our wants.

To this the Rev. Mr. Gleig answers—"That Moses wrote not to instruct mankind in astronomy, but to convey to his own countrymen, a simple and pastoral people, just notions of the Divine nature. He, therefore, speaks of other planets wholly as they seem to affect us; but he by no means affirms that they were called into existence for our benefit alone. On the contrary, we are left to form concerning them what conjectures we please, provided we regard them, as they must be regarded, as creatures of the great Creator, whilst his details are uniformly confined to the single subject of this world's early history. It is very possible that other worlds have histories of their own, in which our globe is made to bear the same relation towards them which they bear towards us; at least he who believes so believes that which is nowise contradictory to the Mosaic character."—"Moses nowhere represents this globe as the chief of God's works." *

In our English translation of the Old Testament, we read in the first chapter, that "God made two great lights, the greater light to rule the day, and the lesser light to rule the night: *he made the stars also.* And God set them in the firmament of the heaven to give light upon the earth." Mr. Gleig notices here that, "with respect to the phrase, 'and he made the stars also,' it is to be observed, that the words '*he made*' are avowed interpolations. They have no business whatever where they are, for the sacred historian is not speaking of the creation of the stars at all. He is merely stating, in the figurative language of poetry, that God made the moon the ruler or queen of the stars." That is to say, speaking of their relative importance to us—their *seeming* difference in magnitude—for the moon is small indeed in comparison with the least of the stars, and only appears larger from being so much nearer. It does not thus seem to have been the intention of Moses to include the formation of the stars as taking place at the same time as that of the sun and moon or the earth. The understandings of men in the early ages were not in that state of advancement which could have understood the great and sublime truths of astronomy which God has chosen to reserve for later days. The modern discoveries, when properly compared with those glimmerings of knowledge on certain points (communicated only to a certain extent by the Scriptures), do not invalidate, in that degree which many have thought, the revelations handed down to us; for, when allusions were made to natural phenomena, they were, of course, in the language adapted to the state of knowledge at the time. It never could have been meant that we should not interpret whatever relates in the Bible to natural appearances, by the knowledge of them which their Creator has been pleased to bestow upon us—else it might be argued that the sun itself rushed through the heavens in a vast circuit, and with a rapidity of motion beyond our comprehension, in order to enlighten and warm one of the least of the planets attending him, and that the earth was immoveably fixed in one place.

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* [illegible] —Vol. I. p. 48.

Were there any direct revelation in Scripture incompatible with the stars (generally speaking) being worlds or mansions for living creatures, or even were there any passages there from which this might be fairly inferred, no good Christian would believe in such an idea; but there are none such; and to discredit the belief, because it may not be thought explicitly sanctioned by the inspired writers, would be as absurd as we now consider the denial (on grounds much the same) of the possibility of the existence of such a part of this globe as America, by the conclave which sat at Salamanca, to decide on the proposals of Columbus. It would be of a similar nature also with the answer of the Caliph Omar regarding the fate of the famous Alexandrian library.—" If it contains," said this barbarian, " no more than what we find in the Koran, its volumes are superfluous. If they pretend to greater knowledge, it is of no use, and ought not to be listened to.—Burn the whole."

I shall now proceed more minutely to inquire whether the doctrine we are examining be agreeable to the Scriptural books of our religion, sanctioned by their divine authority; or whether they are silent on the subject, leaving us consequently free to draw our own conclusions from astronomical observations; or, lastly, if any particular passages contain information which must now be considered at variance or otherwise with such a doctrine. In this examination we ought to try if we can discover the meaning which the sacred writers intended to convey, and that in which they would naturally be apprehended by those who then heard them. We ought to remember that the divine intimations were not always couched in words the sense of which was perfectly understood at the time; and of this we have many examples, particularly those prophetic revelations which fulfilment alone explained. As the writers, too, wrote not of themselves, it is not improbable that darkly-expressed information was sometimes given in terms which could not be completely understood for ages. We should therefore consider well what sense some of the passages alluded to will bear agreeable to that advancement in comprehension which we *now* possess.

It is so frequently insisted on that revelation is here at variance with philosophy, that it is of the greatest consequence to give the question the fullest and most impartial investigation. When it is seen that many wise and grave Christian authors have maintained a plurality of worlds as consonant to the Scriptures, and have drawn additional motives for piety to God from their extended views of the universe, we may at least give, even at once, their learning and their researches credit in so far as to believe that they *may* be right in their understanding of the inspired writings.

Mr. King, in his very learned work entitled "Morsels of Criticism," is disposed to think that the Old Testament does contain an anticipation of the doctrine of a plurality of worlds, and that this is preserved in the Septuagint translation;* but that "our later translators have departed from the turn given in the Septuagint to several passages of Scripture, merely because they did not apprehend the meaning of that *vast extent of idea* contained therein; and therefore thought it right to confine the sense of the words to a narrower scale, and to mere earthly objects, and to such things and events as they were already acquainted with." In another place, and with the utmost respect for the Scriptures, he states his belief to be that "the expressions of Scripture are generally applied with such wonderful and astonishing

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* This translation is into the Greek language, and was made from the original Hebrew of the Old Testament by seventy-three of the most learned of the Jewish doctors about 280 years before Christ, and was often referred to both by him and his disciples.

nice caution, that, with due attention, we may *now* perceive what the true meaning intended to be conveyed was; and that they were dictated by a Spirit who knew all things, before *we* should have faculties to investigate any part."

Another writer adds his testimony nearly to the same effect. "I believe," says he, "many passages in the Gospels and other parts of the New Testament, but certainly some in the Old Testament, might be selected which would bear a construction very conformable to the doctrine now laid down. But, though some of the passages we shall make it our business to point out, yet we must beg to be understood, that we do not hold the opinion itself to be of that weight as to justify any *forced* interpretation of the Scriptures whatsoever. It will be more readily granted that the doctrine is not expressly to be made out from Scripture; that, as the holy writings of the Prophets, Evangelists, and Apostles, were principally, if not entirely, confined to the setting forth of the mediatorial redemption of the sons of men on this globe only, it could not fall within their scope to extend the matter farther. Besides, it might not be known to them (though, I confess, I am inclined to think otherwise), for we are not taught by divine revelation that there is a plurality of worlds, though it seems to be a very well-founded conjecture in philosophy." *

Although the Scriptures do not pretend directly to teach that the stars are worlds, and although their words may not have seemed to imply so much to those originally addressed by them, yet it is perfectly possible that we may see clearly that their expressions and allusions have a plain reference to such a belief. We have gradually accumulated a preliminary knowledge which is absolutely necessary to be known before such a doctrine could be expected to be generally received and believed. It was necessary, previously to have a true idea of their distances from us, in order that we might in some degree judge of their sizes, and to be aware of some points of general resemblance between them and this world; for to the naked eye they appear to be mere small specks of light, where living creatures could not exist, and we are too apt to fancy that, unless we ourselves—exactly as we are formed and adapted in every way to the world around us—could

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* An attempt to show how far the philosophical notion of a plurality of worlds is consistent, or not so, with the language of Holy Scriptures, p. 49.—*Anonymous*, 1801.

live on such stars, that no other sort of beings could do so.

When we admit that the Scriptures may not, in perfectly plain terms, sanction the doctrine, none are entitled to infer from this that it is contrary to fact. Many authors have most ably, and, I think, unanswerably shown, that the sacred writers had a far different object in view than that of instructing us in any system or branch of philosophy. Nevertheless no harm, I apprehend, can arise from bringing our philosophical notions to the test of Scripture, which would be a more reverential mode of proceeding, than to bring the Scriptures, as some attempt to do, to the test of philosophy. Whenever philosophy is to be found in agreement with the Word of God, it deserves to be supported by its divine authority, and more especially when its discoveries tend to enlarge our notions of the glory of God; in all which cases it can only serve to strengthen the many proofs we have of the divine original and infallible truth of the Sacred Writings.

The idea believed by some to be founded on Scripture of the stars being created at the same time as this world, and as, in a manner, subordinate to the earth in their consequence, certainly seems, in the first place, to militate against the notion of their being even equal in magnitude and importance, and still more against their being inhabited worlds themselves.

That God created the stars as well as the earth originally out of nothing, there can be no doubt; for this meaning is implied by the true sense of the Hebrew of Moses; but in the work of the fourth day, or, indeed, in all the six days, it is plain that the absolute *creation* (strictly speaking) even of the earth is not included; for we must understand, from the expressions used, that it was only this world—this present surface of the earth (or, at least, as it appeared before the flood)—that was then formed *out of a previously-existing chaos*, a former earth, in short, whose surface had been overwhelmed or somehow destroyed, and was then renewed, and again fitted to be a habitation for living creatures. The greater part of the globe seems to have been covered with water; and darkness, we are told, was on the face of the deep—not that the deep, or the sea, was then itself created, and the earth, or dry land, was *without form*, revelations which the discoveries of geology also show as clearly as they do the fact of a general deluge. The passage of the Jewish historian alluded to seems worded with great caution; and, so far from confounding the creation of the stars with our mundane system, evidently distinguishes them in this respect from each other, as before observed by Mr. Gleig. In the Decalogue, it is expressly said, that "*in six days* the Lord made *heaven* and *earth*"; but this, in the original, has by many Commentators been confined to our terraqueous globe and its accompanying atmosphere, often in common language denominated *the heavens*. Bishop Patrick says that he thinks "the heaven here does not mean the fixed stars;" and adds that the latter "do not seem to be included in the six days' creation, which relates only to this planetary world, that has the sun for its centre." Moses, after mentioning the making the sun and moon to rule or regulate our days and nights,* adds, without any immediate reference to the purposes of this earth, but as if he was mindful that these two lights could not be seen without our having a prospect into the universe, and very possibly to guard, at the same time, against the early idolatry that men fell into, the worship of the orbs of heaven, he adds, *" and the stars,"* that is, he made not only our earth and appointed its two great lights, the central one, common to the system, and an attendant planet, to throw on us a reflected light; but that (at no stated or determinate time) he also made the stars, these systems around us. However indefinite the precise time of their creation, they were all made by God, so they are all upheld by his providence. It is revealed to us, that the great heavenly power, or divine spirit who afterwards took our human nature upon him, was also the immediate Creator of all worlds and things. Since Christ was " with God in the beginning," since " all things were made by him, and without him was not any thing made that is made," shall we measure his relation to created things by the date of our globe? *When* the first of these innumerable systems around us was called into existence it is in vain even to conjecture, but we are not bound to believe that any of them are of so late a date as our own particular system. Holy Writ represents even the morning stars as rejoicing or singing together at the creation of the earth; or rather allusion seems to be made in the passage to the time of the gracious *renovation* of the earth by God, when it was fitted for our reception and adapted to our wants. The expression may refer to the *inhabitants* of these stars, who consequently must have been well acquainted with the benevolent purposes of the Deity in doing so, and have had an existence and habitation long previous to this world of ours being formed.

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* This does not preclude our believing that there are other purposes which these two bodies were meant to serve than merely enlightening our globe. We know for certain that there are others. The sun produces heat as well as light; and, by its gravity, retains the earth in its proper course, contributing also, by the same power, along with the moon, to regulate the tides of the sea; and they may be both likewise inhabited worlds. Not only does the influence of the sun extend to the earth but also to all the planets; and to these it is, without doubt, as useful as it is to us.

There has been an objection stated to the existence of similar worlds to the one on which we are placed, grounded on the following reasons:—It is argued that it cannot be supposed, if our globe is but one of many, that it is the only one inhabited by beings liable to sin; and, if there be others of a like constitution, then as improbable is it that ours is the only one exposed to the temptations of the evil One.* Consequently, as it is probable that we stand not alone, other worlds have as great need of a Redeemer as we have; yet the Scriptures speak of him as dying for *mankind*, making no mention of any other race as benefiting by his sufferings, and it is certain that he died among men. It is true that he offered himself up for our sins, but we are not aware that *the consequences* are limited to men. We know that not only shall those then alive on earth reap the benefit of it along with those since born, and until the last day, but those departed souls also who, after the general judgment, shall be called by their Lord to enter into heaven, and who, at the time of its accomplishment, were in another world, the paradise of Hades—that middle state of rest believed in by the Jews, and so explicitly confirmed by the Scriptures. It included, in short, two worlds, this and the world of departed souls, wherever the latter may be supposed to exist. How far the redemption may extend—how many worlds may be included under its power, we know nothing, and it is in vain to conjecture; but it is not an argument which can be used to overthrow a belief in a plurality of worlds, when it rests on no reasonable evidence. We might as well deny the feasibility of the idea, by attempting to show that their inhabitants could not be formed exactly as we are, as may very probably be the case.

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* "Yea," saith Job, "the heavens are not clean in his sight," (which Bishop Patrick paraphrases—"*the heavenly inhabitants are not without their spots*") "the stars are not pure in his sight," or, the people of the heavenly or starry orbs; ch. xv. 15. xxv. 5.

Bishop Porteus, after stating that the power and high quality of Satan required an opponent of the highest possible dignity, makes the following remarks:—"There is still another consideration which merits some regard in this question. It is, I believe, generally taken for granted, that it was for the human race alone that Christ suffered and died; and we are then asked, with an air of triumph, whether it is conceivable, or in any degree credible, that the eternal Son of God should submit to so much indignity and so much misery for the fallen, the wicked, the wretched inhabitants of this small globe of earth, which is as a grain of sand to a mountain—a mere speck in the universe, when compared with that immensity of worlds and systems of worlds which the sagacity of a great modern astronomer has discovered in the boundless regions of space. But on what ground is it concluded that the benefits of Christ's death extend no further than to ourselves? As well might we suppose that the sun was placed in the firmament merely to illuminate and warm this earth that we inhabit. To the vulgar and illiterate this actually appears to be the case. But philosophy teaches us better things. It enlarges our contracted views of divine beneficence, and brings us acquainted with other planets and other worlds, which share with us the cheering influence and the vivifying warmth of that glorious luminary. Is it not, then, a fair analogy to conclude, that the great spiritual light of the world—the fountain of life, and health, and joy to the soul—does not scatter his blessings over the creation with a more sparing hand; and that the sun of righteousness rises, with healing in his wings, to *other orders of beings besides ourselves?* Nor does this conclusion rest on analogy alone. It is evident, from Scripture itself, that we are by no means the only creatures in the universe interested in the sacrifice of our Redeemer. [See *Ephesians* i. 10.; *Colossians* i. 16. 20.] From intimations such as these, it is highly probable that, in the great work of redemption as well as of creation, there is a vast stupendous plan of wisdom of which we cannot at present so much as conceive the whole compass and extent; and, if we could assist and improve the mental, as we can the corporal sight—if we could magnify and bring nearer to us, by the help of instruments, the great component parts of the spiritual, as we do the vast bodies of the natural world—there can be no doubt, but that the resemblance and analogy would hold between them in this, as it does in many other well-known instances; and that a scene of wonders would burst in upon us from the one, at least equal, if not superior, to those which the united powers of astronomy and optics disclose to us in the other. If this train of reasoning be just (and who is there that will undertake to say, much more to prove, that it is not so?)—if the redemption wrought by Christ extends to other worlds, perhaps many others besides our own—if its virtues penetrate into heaven itself—if it gather together 'all things' in Christ—who will then say, that the dignity of the agent was disproportioned to the magnitude of the work, and that it was not a scene sufficiently splendid for the Son of God himself to appear upon, and to display the riches of his love, not only to the race of man, but to many other orders of intelligent beings? Upon the whole, it is certainly unpardonable in such a creature as man to judge of the system of our redemption from that very small part of it which he now sees; to reason, as if we were the only persons concerned in it; and, on that ground, to raise cavils, and difficulties, and objections."—Vol. ii. Serm. 3.

If philosophy shall have served to enlarge our views of the Creation, I cannot see how it should at all detract from the goodness of Providence displayed towards the creatures of this earthly planet, if we endeavour to comprehend under one great scheme of moral government more worlds than our own.

The prophet Nehemiah says, in the words of our translation, "Thou, even thou, art God alone. Thou hast made heaven, the heaven of heavens, with all their host; the earth and all things that are therein, the seas, and all that is therein; and thou preservest them all; and the host of heaven worshippeth thee."

The right rendering of the verse just quoted, though nearly word for word the same, would apply still more closely to the system of a plurality of worlds, and, I think, expressly of *inhabited* worlds. The original would be more closely translated by, "Thou hast made *the heavens*" (plural in the Hebrew), "*the heaven of heavens*, and all the rest of them; the earth, &c. and *thou givest life* to the whole; and the *host of the heavens* worshippeth thee." *The host of heaven*, it is allowed, sometimes signifies *the stars* and sometimes *the angelic host*; but "the heavens," from being mentioned along with "the heaven of heavens," would seem to imply *the starry region*, or rather the stars themselves, to which the Jews frequently gave the appellation of *the heavens*.* The heaven of heavens, it is well known, denoted the peculiar seat of God's glory and the sanctum of the Most High. The *host* of the latter would be the angelic choir; the host of the former, *their rational inhabitants*; next come *the earth* and the seas; then follows, "and thou givest life to all;" and "the hosts of the heavens worship thee." Thou givest life to the earth and seas must needs imply the filling them with animated beings, and must we not conclude the same of *the heavens?* The sidereal host of heaven, if applied only to the heavenly orbs themselves, would be but a portion of the *inanimate* part of the creation; and the verb ζωοποιεω, as used in the Septuagint, could, in no sense, apply to them. Ζωοποιεω, at least, would have been a dangerous word to have applied to the heavenly bodies, in any other sense than that of filling them with inhabitants, down to the very æra of Christianity; for some of the ancient philosophers were disposed to think them *animated* and *gods*. Nay, even a few of the Fathers, and, according to Maimonides, the Jews also, embraced this opinion of their being animated, and, what is more remarkable, upon the authority of this very passage of Nehemiah. Taking now into consideration the account given by many Commentators of the use of the word Ουρανος; and if the Seventy are justified in translating the Hebrew word שמים *(Shamim)*, by Ουρανοι, as they constantly do; and if the word that we render *host* may stand for *inhabitants*, as seems to be the case; then the passage might *literally* be translated thus:—"Thou, even thou, art God alone; thou hast made *the worlds, the universe of*

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* It ought to be attended to here, that the Jews comprehended *three heavens* under the general term of *heaven*:—the air around the earth, the starry firmament, and the unseen sanctuary of God.

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* Morsels of Criticism. Vol. I. p. 3.

worlds, with all their inhabitants; the earth, and all things that are therein; the seas, and all that is therein; and thou fillest the whole with life; and *the inhabitants of the worlds* worship thee."

The creation of *the heavens,* as of many different heavenly abodes, is noticed as well as that of the earth, which latter is only mentioned as one of the innumerable works of God, or worlds for his creatures. "Thus saith Jehovah, who created *the heavens;* he is God; who formed *the earth,* and made it; he hath established it! *He created it not in vain; for he formed it to be inhabited.*" If a *scriptural authority* was wanting for the philosophical doctrine of a plurality of worlds, the inference to be drawn from *this* expression of the prophet's seems to me plain and obvious. If we admit that the stars are at a vast distance, then, to be seen as they are, they must be of prodigious magnitude, that is, worlds in bulk, as already observed; yet some have hesitated not to insist, they must be all desert and uninhabited, or created *in vain!* as this earth, according to the above authority, might have been called, had it not been intended to be the dwelling of living beings.

"For I will consider the heavens the work of Thy fingers, the moon and the stars which Thou hast made." Ps. viii. 3.

If this verse is to be referred to the responsive style of the Hebrew poetry, then "*the moon* and *the stars*" would be synonymous with *the heavens*; and it is indeed cited by Mr. King, among the passages in which "the heavens are put for the fixed stars." "By the Word of the Lord[*] were the heavens made, and all the hosts of them by the breath of his mouth." Ps. xxxiii. 6.

If *the heavens* will here admit of being taken for the systems around us, nothing could be more consistent with the revealed account of our own origin, than the above would be, as referable to those other habitable orbs. The translation might stand—"By the Word of God were all the worlds above made, and by his spirit[†] their several inhabitants endowed with life."

"He shall call to *the heavens* from above, and *the earth*, that he may judge his people." Ps. l. 4.

The heavens and *the earth* are so continually introduced in this way, not as one phrase, but as *severally* illustrative of God's glory, or amenable to his judgements, that it must be with difficulty that we could confine such expressions to the limits of our system. When God would call a general assembly of his creatures, and make up an universal auditory, the prophet cries out, "Hear, *O heavens:* and give ear, *O earth.*" "Who is like unto the Lord our God: who hath his dwelling so high, and yet humbleth himself to behold the things that are in *heaven* and *earth.*" Although "heaven," in our version, is in the singular, it is in the plural in the Hebrew.

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[*] *Christ* is frequently so called both in the Old and New Testaments.

[†] The word in the Hebrew signifies *spirit* as well as *breath*, and the adoption of the former would bring it nearer to the passage in Genesis which speaks of the Spirit of God moving on the face of the deep; or, more literally, *hovering over* the new creation, as a bird hovers over her nest.

"All the whole heavens are the Lord's: the earth has he given to the children of men," (Ps. cxv. 16.) or more literally—"The heavens, the heavens, are the Lord's; and the earth he has given to the sons of Adam."

Various passages might be cited in which the one and the other of these terms are thus distinguished, and the first may very fairly and consistently be understood as the heavenly worlds or orbs. That by *the heavens* is sometimes meant more than one place, may be gathered from many scriptural passages, such as the following:—"That extendeth the heavens as a thin veil, and spreadeth them out as a tent to dwell in. Lift up your eyes on high, and see who hath created *these*. He draweth forth *their armies* by number; he calleth them all by name,——not one of them faileth to appear."

The probability has been already shown that some of the stars may be inhabited by beings not only liable to sin, but, like us, fallen from their first estate, consequently amenable to judgment. "He shall call *the heavens* from above, and *the earth*, that he may judge his people." Ps. l. 5.

In our translation of the New Testament we read, in the eleventh chapter of the Epistle to the Hebrews, at the third verse, "Through faith we understand that *the worlds were* made by the Word of God." Here, the plural being used, and signifying, in the above English sentence, more worlds than one, of course the doctrine of a plurality of worlds seems to be distinctly founded on by St. Paul: but, on examining the original, instead of finding the Greek word *Κοσμος* employed (which is the one used to signify *the earth*, strictly speaking), the word *αιωνες* is in its stead, and the latter more properly relates *to time*, —to certain or uncertain periods of duration, or to revolutions produced by time, as a careful comparison of the different scriptural passages in which it is used decidedly show, is at least the general sense of the word, and any other signification supposed to be given to it in a particular passage, is at best but doubtful, and cannot be much depended on. In the one above referred to, the learned Parkhurst does indeed appear to indicate that it may be understood more widely: He says—"Αιωνες seems, in Heb. xi. 3. to denote the various revolutions and grand occurrences which have happened in this created system, including also *the system*, or *world itself*." It will be remarked here, however, that the word in question being plural, though it may fairly enough be rendered by the first and second expressions, yet it would not apply to the last rendering, which is singular. I do not clearly see how the above senses can be understood taken together as a whole, but if really applicable to the materiality of the earth at all, then it must be held as also applying to a plurality of such earths, not merely to this one globe.

"And other sheep I have, which are not of this fold; them also must I bring; and they shall hear my voice, and there shall be one fold and one shepherd." John x. 16.

Though we may understand this to have been spoken only of the Gentiles in the first instance; yet, how beautifully and literally might it apply to those other worlds in the heavens over our heads if peopled as we have supposed with intelligent beings, subjects of the same God, and being created by him, of course superintended and cared for by him the same as we are.

"In my Father's house are *many mansions*; I go to prepare *a place* for you." This passage seems most strongly to favour the idea of there being many heavenly mansions or worlds, all probably of different states of splendour, and formed for different degrees of happiness, and we have also divine authority for believing that "one star differs from another star in glory." "Perhaps," says Mr. King, "the idea of the fixed stars being really *heavens* may also, with propriety, be awfully kept in view, both when we read those words of our blessed Lord, "In my Father's house are *many abodes*; and that sublime passage in the epistle to the Ephesians—"He that descended is the same also that ascended up far above all heavens."—Ch. iv. 10.

Mr. Wright of Durham, in his *Theory of the Universe,* (published in 1750) seems, like Mr. King, to place our heavenly abodes among the stars; in one place calling them "*the manifest mansions* of reward and punishment, suited, no doubt, most equitably to all degrees of virtue and vice."

An anonymous author who undertook the inquiry as to the stars being worlds, solely with a reference to Scriptural authority, says, as the result of his re-

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"It is a strange perversion of science," says Dr. Beattie,† "when men contract their views in the same proportion in which their knowledge of nature is ex-

tended. Yet this must be the case of those who think it easier to divine power to make and preserve one world, than to create and govern ten thousand worlds. If we judge of the divine power from what we know of our own, both are impossible. And to divine power, supposed to be infinitely superior to ours, both are not only possible, but easy, and equally so. The time was, when this globe was believed to be the universe; and the sun, moon, and stars to have been for no other purpose but to enlighten and adorn our habitation. If he who entertains this opinion finds no difficulty in conceiving it possible for the Deity to superintend terrestrial things, and to prepare the means of happiness, both here and hereafter, for man, to whose dominion they are all subjected; why should it be more difficult for the enlightened astronomer to conceive that the Creator of all worlds is equally attentive to provide for the innumerable works of his hand? Every new discovery in the visible universe ought to give elevation and a new impulse to the pious affections; and the further we see that the works of God extend, the more let us be overwhelmed with devout astonishment in the contemplation of his infinite, eternal, and universal being." *

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"The most entertaining writer of this kind was Fontenelle, who dressed up these conjectures in a very romantic form, and, by a number of far-fetched analogies presumed to be discovered between the starry heavens and the earth we inhabit, he has succeeded in gaining the attention of the public."

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* Evidences of the Christian Relig. Vol. II. p. 150. Orig. edit.

searches, that as to his own mind, it is much more than satisfied of the truth of this idea of the great purpose for which they were created. "The doctrine itself," he adds, "of a plurality of worlds in the universe, tends, in my opinion, greatly to exalt our notions of the power and majesty of God; and therefore I could not help thinking, that any view of his works, apparently so well founded, and having *such* a tendency, was not likely to be contradicted by his word; for, as in regard to the visible works of God, I have insisted upon *demonstration*, before they may be admitted in evidence against revelation; so in respect to the word of God, I expect any false notions of philosophy to be positively *contradicted*, before I am to consider myself bound to believe the Scriptures as actually in opposition to the doctrines that prevail. My mind, therefore, has been more than satisfied in regard to this particular conjecture of philosophers, by finding that much might be adduced to prove that the word of God does certainly not appear to *contradict* it." *

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* "'ΕΙΣ ΘΕΟΣ, 'ΕΙΣ ΜΕΣΙΤΗΣ, or an attempt to show how far the philosophical notion of a plurality of worlds is consistent or not so, with the language of the Holy Scriptures."

In the foregoing examination of those scriptural texts apparently bearing in some degree upon the point at issue, I have been much indebted to the above work.

Let us now proceed from Scripture and the investigations of its Commentators, to the opinions of philosophers, resting on their observations of what we, in imitation of the Jews, still, in common language, style *the heavens* and *the heavenly bodies*.

About a hundred years ago the French philosopher Fontenelle (Secretary to the Academy of Sciences), published a little work entitled "*Pluralité des Mondes*"—in which are detailed supposed conversations between himself and a lady of rank on this subject. The question, however, is treated in these in so flippant a manner, that the reader can scarcely understand, in some places, whether the author is in earnest, or is merely allowing his fancy to soar into the regions of imagination for amusement, and the astronomical facts he refers to are so intermingled with *badinage*, that the whole bears too much the appearance of mere playful invention. The book became very popular in France, and continued so throughout Europe for many years, though its apparent want of seriousness could not have led to many convictions of the probable truth of such a notion as it professed to inculcate. I shall not at present enter upon the reasons this author gives for crediting the doctrine of the planets being peopled with some kind of beings, farther than mentioning that he naturally infers it from their alleged general similarity to the one which we ourselves live upon;

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"Had our Saviour," remarks a pious writer, "never told us, that in his Father's house there are many mansions, the wonderful improvements in astronomy have introduced us to the knowledge of worlds innumerable, and some of them immensely large. Our earth is no more but a speck in the creation; and we never, therefore, can be so far prejudiced in favour of this earth, as to fancy that this is the only abode of rational creatures; and that all the other bodies in this universe were created only for the amusement and glory of man. It is more consonant with the magnificence of the Creator to believe that these bodies of such immense size are inhabited, and by rational beings; and that some of them may be allotted for man in a state of innocence, and to be the abode of good men, after having passed through the present state of trial." *

M. Sturm, a celebrated German philosopher, in his well-known work entitled *Reflections on the Works of God*, argues in the same manner:—"Would a Being, infinitely wise, have adorned the celestial vault with so many bodies of vast magnitude, merely to please our eyes, and to afford us a magnificent sight? Would he have created innumerable suns, merely that the inhabitants of our little globe might have the pleasure of seeing in the sky some luminous specks, the particular nature and purpose of which they very imperfectly know, and which are even but seldom observed? Such an idea cannot be formed by any body, who considers that there is, throughout all nature, an admirable harmony between the works of God and the purposes he designs them for; and that in all he does, he has in view the advantage as well as the pleasure of his creatures. It cannot be doubted but that God, in placing the stars in the sky, has had much higher views than that of affording us an agreeable sight."*

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* Various views of Death for illustrating the Wisdom and Benevolence of the Divine Administration in conducting Mankind through that awful change, by the Rev. Thomas Watson. 1819.

The Earth is one of eleven planets which revolve round the sun: two are nearer this great luminary than we are, and the rest move on in their circular course beyond us. In several important points the other planets resemble the earth, but all of them are very different in their natures from the sun. The fixed stars (as they are commonly called) are believed to be suns, although vastly more distant from the earth than our own sun, so the question as to any of these heavenly bodies being inhabited, or fit for being so, should resolve itself into three distinct branches of inquiry :—

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* Reflections—February 4th. (Translated in the text.)

1st, As to the planets;

2d, As to the sun and the fixed stars; and,

3d, As to the moon attendant on our earth, and those moons belonging to the other planets of our system.

The adoption of the *Copernican*, or rather as we may term it, the *Newtonian* System, from the illustrative and demonstrative discoveries by which our greatest philosopher established it, has furnished us with some of the principal natural arguments for believing in other habitable worlds than our own.*

A learned writer observes of this system, that although it teaches that the earth revolves on its axis, and moves in a circle round the sun, yet, to the common eye, it is our globe which is at rest, and the sun that seems to travel round it. We must not, therefore, decide in such matters by the first glance, or without every investigation in our power. "Who can persuade himself," says he, "by the mere testimony of the senses, that the body of the sun does not *revolve?* A plurality of worlds is still less to be ascertained with any certainty; not being expressly revealed by the word of God, and but faintly to be discerned in his visible works: nevertheless, as a philosophical question; as a question, if not of revealed, certainly of natural religion, few will deny that it is an interesting one, and I think more than commonly so: I think it tends greatly to enlarge our conceptions of the divine power and majesty; nor yet is it without its moral uses, even to the promoting, I think, the noblest ends of Christianity." *

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* "Lord Bolingbroke is not content to say, that the Copernican system *leads* to the notion of a plurality of worlds: he affirms that it *constrains us* to suppose other inhabited globes like our own.

In general, the reasons which render the habitability of the planets probable, will not apply either to the sun or moon, so it would not follow that these two dissimilar bodies are peopled by any manner of living creatures, if we should even render it extremely probable that the other planets are so from their similarity to the earth; and, consequently, if no reasons can be shown for the sun being inhabited, then neither should we be entitled to assume that any fixed star is so destined.

When we gaze on the sky at night, the planets are distinguished from those orbs properly called stars, only by their apparent greater size* and brightness; but a more attentive and continued observation of them soon discovers that they change their places in the heavens in respect to the stars, which remain in the same relative position to each other, but have themselves, in a small degree, a vibratory sort of movement, which remained undiscovered until our astronomical instruments had arrived at a considerable degree of perfection.

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* Author of the work mentioned in note, p. 56.

The planets shine, like the moon, by the reflected light of the sun, and are, in fact, far inferior in bulk to the stars, which appear less, merely in consequence of their prodigious distance.†

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* To some it may be necessary to mention, that the sky in the day-time is as much studded with stars as in the night (although they are different ones, from the rotation of the earth bringing us opposite other portions of the heavens), but when the sun shines, his light overpowers theirs—feeble from distance. When we take means to exclude the glare arising from his rays, stars again become visible. When the sky can be seen from the bottom of a deep pit, or is looked at with an astronomical telescope even in the brightest sunshine, the stars may be observed in it. They, in short, encircle the earth on all sides, so that to ourselves the earth appears to be in the centre of the universe, but an inhabitant of any other planet or star would have the same reason to think so of his own dwelling-place.

† The respective sizes of the planets belonging to our solar system are as follow:—

Suppose the planet which we have named *Venus* is really peopled with beings capable of seeing and reasoning in a similar manner as we do. Its inhabitants would then view the earth as we observe their dwelling-place. After a long course of observation their astronomers may have come to know that the earth moves round the sun nearly as they do, and is a globe about the same size:—they find we must have day

The diameter of	Mercury is	3,200	miles.	
	Venus,	7,700	,,	
	Earth,	8,000	,,	
	Mars,	4,200	,,	
Also called Asteroids.	Ceres,	160	,,	[*]
	Pallas,	80	,,	
	Juno,	1,425	,,	
	Vesta,	1,800	,,	
	Jupiter,	89,000	,,	
	Saturn,	79,000	,,	
	Georgium Sidus, Uranus, or Herschel,	35,000	,,	

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[*] The diameters of these bodies do not seem yet to have been clearly ascertained, from their being enveloped or surrounded by a bright and dense haze which tends to hide their real discs, and also from the difficulty of accurately measuring such small planets. Schroeter makes Ceres and Pallas ten times the above diameters. The measurements here given of the Asteroids are as calculated by Herschel.

and night as they have, although not of the same length;—if arrived at great skill in observation, they have discovered that this planet of ours has an atmosphere, and a moon which must contribute to enlighten the earth, and make up to it for being more distant from the sun than themselves. If we suppose their powers of vision no greater than our own, they have seen no actual signs of life on the earth—no traces of art, and can merely infer so from the general similarity of the Earth to Venus. Now, could it be called an unnatural supposition for the inhabitants of that beautiful planet or world to believe the earth to be not only a fit place to support life, but also to be really a mansion for various orders of animated creatures, a world wonderful for its amazing number and variety of both animal and vegetable life?

The telescope shows us that in all the great material points the planets resemble the earth. They all revolve round the sun, and round their axes as the earth does, by which they must have day and night, summer and winter. They seem like our globe to have spots, reflecting the light differently, as proceeding from mountains, valleys, and plains. They are surrounded by atmospheres, and, as far as we can discern, are similar to the ball we inhabit in as far as is necessary to support life, although, like all the works of the

Almighty Creator, each having features differing from another. If we merely knew that they were of a size equal to the earth, or larger, it would be the most natural supposition, that they were formed for the same purpose; but when we have discovered so many similar points of resemblance, the inference is unavoidable. Ignorance may conclude that the stars were created in vain, or for no great end, proportioned to their relative importance in the universe, but when the pious and scientific observer of nature discovers them to be of such enormous magnitude, and the planets of our system so like the earth in many respects, he must consider their utter desolation as inconsistent with intelligence and evident marks of design which the Creator has shown in such boundless profusion in this world. If every part upon earth is so constituted as to support life in some sort of animals, shall we refuse to entertain the reasonable idea, that the numberless globes around us, and, more particularly, our fellow-planets, have been also formed in some degree for a similar purpose. By moving round on its imaginary axis, every part of our globe is in its turn exposed to the beneficial influence of the sun. Even the interval of darkness which each region experiences is not without its use to us. All living things on earth, animal as well as vegetable, have need of repose at regular periods from the exertions which they undergo generally during the day. Every vegetable may be said to sleep in the absence of the sun, though some are seen to do so more visibly than others. Some fold up their leaves and blossoms at night; and, speaking generally, the want of light is the natural signal for creatures to take their repose. Nature, however, with that amazing diversity in contrivance which she seems to love to display in all her works, has suited some classes of animals for activity in the light of day, but others in darkness, or rather in lesser degrees of light. For our present illustration, it is sufficient to point out that some require the light of the sun, and some that of the moon, which the motions of the earth procure them. Now, when we see the same great and benevolent contrivance in the planets, are we not to infer that with them it answers a similar purpose as on earth. Can we credit that they turn like this globe, but for no such end? The similitude holds still further. Some of them also revolve *obliquely*, by being inclined to the plane of their ecliptic, and thus must have a change of seasons, and their surfaces must be therefore adapted from different degrees of heat, to the subsistence of various kinds of animal and vegetable productions as with us. When we see planets attended by moons, shall we not suppose these meant for a like use as our own? I may here point out a strong argument for their being inhabited, founded on the evident means of enlightening them according to their distance from the sun, which is almost demonstrable proof on this question. Those planets which are nearer the sun than the earth is, have no moons that we can discern, but they may probably require less reflected light than we do, from their being immersed in more concentrated and direct light, which, radiating from the sun as a centre, is of course densest the nearer to that centre: their atmospheres also may refract it more, which would prolong a strong twilight appearance to them. There is reason to believe that the planet Mars—the one immediately beyond us—has a very dense atmosphere, and thus, these three, although unprovided with a moon, may have sufficient light on their parts which are turned from the sun. But those great planets beyond Mars have each several moons; Jupiter* having four; Saturn, seven;

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* In M. Fontenelle's Conversations on the Plurality of Worlds, he thus in his usual style speaks of Jupiter and its supposed inhabitants. "Tell me," asks the Marchioness, "if the earth be so little in comparison of Jupiter, whether his inhabitants do discover us? Indeed, I believe not, said I; for if we appear to him

and Uranus (or the most distant planet), six: all which must contribute light to them, while, owing to their vast distances from the sun, they might otherwise be deficient in it. One of them has also two immense broad flat rings (at some distance from its body) which must receive and reflect to its surface

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ninety times less than he appears to us, judge you if there be any possibility: yet thus we may reasonably conjecture, that there are astronomers in Jupiter, who, after having made the most curious telescopes, and taken the clearest night for their observations, may have discovered a little planet in the heavens which they never saw before; if they publish their discovery, most people know not what they mean, or laugh at them for fools; nay, the philosophers themselves will not believe them, for fear of destroying their own opinions; yet some few may be a little curious, they continue their observations, discover the little planet again, and are now assured it is no vision, then they conclude it has a motion round the sun, and after a thousand observations, find that it completes this motion in a year; and, at last, thanks to the learned! they know in Jupiter that our earth is a world; every body runs to see it at the end of a telescope, though it appears so small as to be scarcely discernible! Though the people of Jupiter discover our earth, yet they may not in the least suspect that it is inhabited; and should any one there chance to have such a fancy he might be a little ridiculed, if not persecuted for it. Their own planet is so large, that I suspect that they have work enough to make discoveries on it without troubling themselves with so seemingly insignificant a one as ours."

a great portion of light which would otherwise go past.[*] It is far from impossible that the two planets nearest the sun, Mercury and Venus, have a moon each, or some contrivance similar to the *aurora borealis*, to illuminate their nights; but the earth, as the planet in the third place of the system of planets, has a moon, one great use of which is to receive the sun's light and reflect it upon those parts of the earth on which the sun does not shine directly, and this by a wonderfully-contrived rotatory motion in the earth as well as in the moon. No person disbelieves that one purpose of our moon was to contribute light to the earth in the absence of the sun—the contrivance is too apparent to be doubted for a moment, even if the Scriptures had not remarked it, and shall we then discredit the idea, that exactly similar bodies (in as far as we can see), when circling round other planets, are intended to answer a similar purpose to them as our moon does to us? It can indeed be demonstrated that they must reflect a considerable quantity of light on the planets to which they belong, and can we, consistent with common sense, think that this light is meant only to shine on uninhabited solitudes, where there are no eyes to be benefited by their light? No! Such inferences of their uselessness would be absurd, for they too clearly indicate the contrary, to leave room for our fancying that they enlighten nothing which can be the better of their rays. That the moons and rings round Saturn, for example, are for the purpose, and actually will reflect light on his surface, can no more be doubted, than that our moon does so on the earth, or that this is done for the sake of living creatures, capable of seeing it. The design, therefore, from which proceeded these contrivances for giving the planetary bodies more reflected light *in proportion as their distance from the sun permits them to receive less and less direct light,* as evidently shows and even proves a purpose or end to be answered, as the construction of the eyes of all animals which prey in the night, enables them, whenever they choose, to admit a greater quantity of light by a capability of withdrawing a greater portion of the iris than usual, while those creatures which are exposed to a bright light, are able to contract the pupil of their eyes to a mere point.*

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[*] "Nature has not only given Saturn five moons, but she has encompassed him round with a great circle or ring; this being placed beyond the reach of the shadow which the body of that planet casts, reflects the light of the sun continually on those places where they cannot see the sun at all. I protest, says the Marchioness, this is very surprising, and yet all is contrived in such great order, that it is impossible not to think but that nature took time to consider the necessities of all animate beings, and that the disposing of these moons was not a work of chance; for they are divided among those planets which are farthest distant from the sun, Jupiter and Saturn; indeed it was not worth while to give any to Mercury or Venus, they have too much light already, and they may account their nights, short as they are, a greater blessing than their days." Fontenelle's Plurality of Worlds. *Translated in the text.* Two additional moons attendant on Saturn were discovered since the time of Fontenelle.

"To suppose that the stars were made only to give a faint glimmering light to the inhabitants of our globe, must bespeak a very unworthy opinion of the divine wisdom, for many of the stars are so far from benefiting us, that they cannot be seen without the aid of a telescope; and the Deity, by an infinitely less exertion of creative power, could have given our earth far greater light by only one additional moon. Every star is undoubtedly the centre of a magnificent system of worlds, as our own sun is. Thus, the greatness of God is magnified, and the grandeur of his empire made manifest. He is not glorified on one earth, or in one world alone, but in ten thousand times ten thousand." *

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* No work of nature within our observation, displays so obviously the power, the wisdom, and the never-failing endless invention of the Almighty hand, as the thousands of contrivances which he displays in the construction of the eyes of different animals, adapting them so curiously to the necessities of their owners. Our telescopes, our microscopes, and other optical instruments, do not more evidently display contrivance by necessary and ingenious combinations indicating design, and consequently a Designer, than do these living instruments referred to.

Whiston, an English divine and celebrated mathematician, who died in 1752, assures us, that "It is not to be questioned, were we as well acquainted with the nature, constitution, and uses of the other planets, with their various inhabitants, and the several methods of divine providence relating to them all, as we are with our own, we should not be backward to allow them every one a proportionable share in the care of heaven, and a like conduct in their origins and periods, as the earth on which we dwell can boast of."

Conybeare, a contemporary clergyman of the last, and of the same church, says, "It betrays a great narrowness of mind to suppose, that this earth, on which we live, is the *only place* that is filled with conscious and intelligent beings."

In the reign of George II. an excellent little work on astronomy was written by the Rev. William Derham, "in vindication," as the author observes in his dedication, "of the existence and attributes of that infinite Being to whom," &c. On the subject of the planets being habitable bodies, he says, "Having thus represented the state of the universe according to the new system of it, the usual question is, what is the use of so many planets as we see about the sun; and so many as are imagined to be about the fixed stars? To which the answer is, that they are worlds, or places of habitation, which is concluded from their being habitable and well provided for habitation. This is pretty manifest in our solar planets, from their being opaque bodies as our earth is, consisting in all probability, of land and waters, hills and valleys, having atmospheres about them, moons ministering unto them, and being enlightened, warmed, and influenced by the sun; whose yearly visits they receive, for seasons; and frequent returns or revolutions, for days and nights."*

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* Wonders of the Heavens displayed.

The intelligent author of a popular work, entitled *Body and Soul*,† thus expresses his belief in the heavenly orbs of light being inhabited:—"You cannot doubt that the planets are inhabited by intelligent beings, who, if not formed as we are, are, nevertheless, equally with us objects of care of the same Providence: nor can you deny that every fixed star is the sun to a system like our own.* Can you, then, whilst surveying an universe extending on all sides from and to places that have neither beginning nor ending, studded with worlds and systems innumerable, suppose that our globe, so trifling in the endless ocean of infinity, is alone inhabited?"

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* Astro-theology; or a Demonstration of the Being and Attributes of God, from a Survey of the Heavens.

† The Rev. G. Wilkins, Vicar of St. Mary's, Nottingham.

An assiduous observer of nature assures us, "That the planets are inhabited, we have every reason to believe, from the provision that is made for their comfort, and analogy they bear to our own inhabited globe."†

If this world appears to us to have been intended for the residence of living beings, we cannot, indeed, with consistency, deny *the possibility*, or even *the probability* of their existence, on nearly similar orbs as the planets evidently are. Not only may all the planets with which we are acquainted, both primary and secondary, be inhabited, but each fixed star may be the sun of its own particular system of planetary bodies. That these last are invisible, even with our best glasses, is no reason against their existence, for the largest of ours would be so, if placed at the distance of the nearest star. Since our sun is so surrounded with dependent globes, it is more probable than otherwise, that these distant suns have also such an assemblage, as one purpose of their creation. If these imagined bodies bear the same relative proportion to their respective suns as the earth and our fellow-planets do to our sun, they must be by far too small to be seen by us, and, besides, their reflected light could not be supposed able to penetrate to the earth.

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* Although this certainly cannot be decidedly *denied*, yet it cannot be *proved* to be the case with our present knowledge; and is only very probably true from analogical reasoning. As our sun seems to be of the nature of a fixed star, and is surrounded with planets, therefore it is likely the stars are so likewise, although they are too distant for us to see their planets.

† Popular Philosophy; or Book of Nature laid open. 1826.

I have said that I was early instructed to look upon the planets as being inhabited globes, and that the fixed stars, from their much greater distance, must consequently be of still greater dimensions; I shall now give the words in which these great—I had almost said—*discoveries* were explained by Professor Copland, and more than fifty years' study of the *rationalé* of this inference from what we see of the universe, tended more and more to confirm his belief in it, during which long period also, he continued to teach it *ex cathedra*.

"The observations made by the telescope have also given us every reason to believe that the multitude of fixed stars, with which the heavens are covered, is each of them a sun attended by his planets, all of which are probably peopled with living beings. Were our sun removed to such a distance from us as they are, we are certain he would put on exactly the same appearance. Now, the chief use of the sun in our system is to distribute light and heat to the planets, and, by the vast mass of his body, to become a centre round which they may revolve. If the fixed stars, then, be suns, it seems highly probable that they have each a system of *inhabited* planets. That all those of our own system are inhabited, can scarce admit of a doubt. It is evident that the one we live on was destined, by its Creator, to be a proper habitation for a number of living creatures; for its air, earth, and waters are crowded with myriads of them. Now, the telescope shows us that in several important points all the others resemble ours. They all revolve round the sun, and round their axes as we do—they have, therefore, the same phenomena of summer and winter, day and night. They have, like us, spots, inequalities, mountains, and valleys. They are all, too, provided with atmospheres; for we have seen the light of a fixed star refracted in passing through the extensive atmosphere of Mars—he has snow upon his body which cannot be produced without one, and must also have clouds and rain. Schroeter has proved the existence of one on Venus, and volcanoes could not exist on our moon without air. In short, there is but one circumstance in which we have not, as yet, been able to compare them. I say, '*as yet,*' because I think it not impossible that, were a telescope constructed still larger than that of Herschel's, *the inhabitants* of the moon might be actually *seen* by it. But, setting aside this expectation, who that sees this earth to be chiefly, if not solely destined for the habitation of living beings, can refuse to believe in their existence on the other planets? On what can this privilege claimed for our globe be founded, unless on a narrow contracted way of thinking in men who cannot go beyond the immediate prejudices of sense?

"From these and many other arguments, modern astronomers have concluded, with a degree of probability nearly approaching to conviction, that every fixed star is a sun, made, by his light, to illuminate, and, by his attraction, to retain in their orbits a system of habitable and inhabited worlds.

"Some writers, more timid than religious, have reprobated this opinion as contrary to religion; but surely this is poorly to maintain the glory of the Creator; for, if the extent of his works can announce his power, it is impossible for the human mind to conceive a more sublime idea of them."*

In a small but excellent treatise on the Elements of Astronomy, by Mr. Mitchell, there is a whole chapter devoted to the discussion of a plurality of worlds, and this truly scientific author thus expresses his own opinion:—"After contemplating the immensity of the universe, and the wonderful order and harmony of the motions of the heavenly bodies, we receive still higher pleasure by the consideration, that they are the habitations of rational and intelligent beings, capable of enjoying happiness like ourselves.——The probabilities of the universe being inhabited are so numerous and strong, that we cannot doubt it; and, as far as the nature of the case will admit, there is every proof that can justly be required or expected. ——It is now so generally received, that not to entertain it would be a singularity."†

The Rev. William Whewell, one of the most learned men of the present day, whose admirable treatise on

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* Dr. Copland's MS. Lectures.

† Elements of Astronomy, &c. to which is added an Essay on the Plurality of Worlds, by James Mitchell, A.M. Author of Elements of Natural Philosophy, &c. Pp. 191—194.

*Astronomy and General Physics, considered with reference to Natural Theology,** is held in such high esteem, expresses his opinion on the point under consideration in the following terms :—" When we look at the universe with the aid of astronomical discovery and theory, we then find, that a few of the shining points which we see scattered on the face of the sky in such profusion, appear to be of the same nature as the earth, and may perhaps, as analogy would suggest, be, like the earth, the habitations of organized beings ;——that the rest of ' the host of heaven' may, by a like analogy, be conjectured to be the centres of similar systems of revolving worlds."

In regard to the fixed stars being fitted to support life, and that they are actually peopled with living beings, we may fairly begin with considering our own sun as one of them—as the nearest star to the earth, and one important use of this vast body is, by its size, to retain around it other bodies, which are called *planets*, on which their great centre of attraction throws light and heat. It may be said, that when such important purposes are answered by the sun, why seek for any other, when his bulk and light are sufficiently accounted for in the economy of nature; but there have been of late years discoveries made as to this star which would lead us to think that these are not the only uses it was intended to serve.

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* One of the Bridgewater Treatises "on the Power, Wisdom, and Goodness of God, as manifested in the Creation." 1833.

The sun was, in old times, thought to be a ball of fire, fearfully hot, and for the sole purpose of communicating light and heat to us. Even some modern astronomers have entertained the same idea as to the heat of this orb, and it requires considerable care to distinguish whether they are trusting to their imaginations, or are drawing their knowledge from actual observation of their own, or of competent observers.

In a recently-published great astronomical work by *a Lady*, which proceeds on the *Méchanique Céleste* of the celebrated French astronomer La Place, and shows a wonderful degree of female attainment in mathematical and astronomical science, the sun is represented as seeming, even to telescopic observation, "to be surrounded by an ocean of flame, through which his dark nucleus appears like black spots."—"The sun," it is further said, "viewed with a telescope, presents the appearance of an enormous globe of fire, frequently in a state of violent agitation or ebullition."* If his real body be *dark*, then *it* cannot be thought to be in combustion, but only its luminous covering. The violent agitation said to be observed, could only be deceptious, and must have arisen (if it ever really was thought to be seen) from a tremulous motion in our own atmosphere, often apparent in warm weather even to the naked eye, and believed to arise from changes of temperature. Allowing, for a moment, the possibility of such a constant ebullition in the sun, every practical astronomer—one used to observation—knows well that his most powerful instrument could not discern it. With the highest power which can be applied with effect to a forty feet reflecting telescope, the surface of the sun appears only slightly mottled (with the exception of a few dark spots), but no *ebullition* whatever has been discovered, and when we remember that the supposed boiling body is at the distance of ninety-five millions of miles from us, the billowy motion must be great indeed to be seen, and quick as lightning in its undulations. The very circumstance of the slow change in general of the shape of the dark spots which appear on the surface of the sun must prove that the luminosity is not a fluid in a state of extensive or universal waving motion. These spots do change, however, in their size and shapes, and are seldom long stationary in their appearance, nay, their very act of change has been observed. "When Dr. Long was examining the sun's image, received upon a sheet of white paper, he observed a large round spot divide itself into two, which receded from each other with immense rapidity. The Rev. Dr. Wollaston perceived a phenomenon of a similar kind, with a twelve-inch reflector: the spot burst in pieces when he was observing it, like a piece of ice, which, thrown upon a frozen pond, breaks in pieces, and slides in various directions."* These appearances, it will be noticed, were not of the nature of an undulatory motion, and were confined to one place at a time, arising, of course, therefore, from some local cause. Dr. Herschel ascribes them to a great explosion on the dark surface of the sun, which rends the luminous matter by which his real body is surrounded, the elastic fluids formed in the interior thus becoming the means of partially removing the veil of light which interposes between us and his solid mass.

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* Mechanism of the Heavens, by Mrs. Somerville. Pre. Diss.

A constant ebullitionary motion would be much more difficult to be perceived than a sudden expansive one, which rends and throws open the bright surface on a certain determinate spot distinctly marked as described.

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* Brewster's Encyclopedia.

Mrs. Somerville informs us that La Place imagined the solar orb to be a mass of fire, and that the spots seen on it are vast caverns occasioned by eruptions; but this theory is much less agreeable to the phenomena discovered by the most accurate observation, than that of Herschel, who believed that the solid body of the sun is surrounded by a dense luminous atmosphere, between which and the real surface, a stratum of clouds interposes, through both of which, at times, there are openings, forming the spots which appear to us of a dark nature, the centre more dark than the edges.

In 1794, Dr. Herschel read a paper before the Royal Society, in order to prove that the sun may be fitted for the habitation of living beings. On the great objection to such a supposition—the prodigious heat imagined to exist in the sun, this great philosopher observes, that "it may not be amiss to remove a certain difficulty which arises from the effect of the sun's rays upon our globe. The heat which is here at the distance of ninety-five millions of miles, produced by these rays, is so considerable, that it may be objected that the surface of the globe of the sun itself, must be scorched up beyond all conception. This may be very substantially answered by many proofs drawn from natural philosophy, which show that heat is produced by the sun's rays, *only when they act upon a calorific medium*; (something capable of receiving them;) they are the cause of the production of heat, by uniting with the matter of fire which is contained in the substances that are heated." "On the tops of mountains of a sufficient height, at an altitude where clouds can very seldom reach to shelter them from the direct rays of the sun, we always find regions of ice and snow.* Now, if the solar rays themselves conveyed all the heat we find on this globe, it ought to be hottest where their course is least interrupted. Again, our Æronauts all confirm the coldness of the upper regions of the atmosphere; and since, therefore, even on our earth, the heat of any situation depends upon the aptness of the medium to yield to the impression of the solar rays, we have only to admit that on the sun itself, the elastic fluids composing its atmosphere, and the matter on its surface, are of such a nature as not to be capable of any excessive affection from its own rays. Another well-known fact is, that the solar focus of the largest lens,* thrown into the air, will occasion no sensible heat in the place where it has been kept for a considerable time, although its power of exciting combustion when proper bodies are exposed, should be sufficient to fuse the most refractory substances."†

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* "Æronauts, and travellers who have visited mountainous countries, have invariably reported that they felt the cold increase progressively as they ascended, the latter always experienced, at the same time, a difficulty of breathing, sickness of stomach, vomiting (even blood), with giddiness of head, and, at certain heights (varying, in different places, under the influence of local circumstances), found regions of everlasting ice and snow, and that in the midst of the torrid zone, whilst the heat in the Champaign country was excessive."

"Philosophers," says Dr. Thomas Thomson, "long supposed that this immense globe of matter was undergoing a violent combustion, and to this cause they ascribed the immense quantity of light and heat which are constantly separating from it; but the late very curious and important observations of Dr. Herschel, leave scarcely any room for doubting this opinion is erroneous. From these observations, it follows, that the sun is a solid opaque globe, similar to the earth or other planets,‡ and surrounded with an atmosphere of great density and extent. In this atmosphere there floats two regions of clouds: the lowermost of the two is opaque, and similar to the clouds which are formed in our atmosphere; but the higher region of clouds is luminous, and emits the immense quantity of light to which the splendour of the sun is owing. It appears, too, that these luminous clouds are subject to various changes, both in quantity and lustre."*

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* Presented to the sun.

† Transactions of the Royal Society for 1794.

‡ Although the real body of the sun may be in so far similar to the earth in being a globe, and of a material structure, yet we have no reason to believe the similitude extends any further.

Speaking of the stars, Dr. Burnet says—"They are far from being all of them fixed in the same vaulted roof of heaven, as to us wretched mortals they appear, but are profusely sown at immense distances from each other, through all the vast concave and profundity of heaven.† It is reasonable to

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[*] Thomson's System of Chemistry, Vol. I.

[†] "The distance of the stars has not been ascertained with any precision, but it is known, with certainty, to be so great, that the whole length of the earth's orbit, or 190 millions of miles, is only a point in comparison of it; and, hence, it is inferred that the nearest fixed star cannot be less than 100,000 times the length of the earth's orbit, or 19 billions of miles. This distance being so great, the best method of forming some clear conception of it is to compare it with the velocity of some moving body, by which it may be measured. The swiftest motion with which we are acquainted is that of light, which is at the rate of 12 millions of miles in a minute; and yet light would be three years in passing from the nearest fixed star to the earth. A cannon ball, which may be

believe, that according to the fulness of the divine power, inhabitants are not wanting to these morning, these first created stars, which sing forth the praise of God, according to the words of Job, when the morning stars sang together, and all the sons of God shouted for joy. These have, I say, their own inhabitants, and animals which are peculiar to them."* Were we able to establish that the sun is a habitable world, we should be entitled to infer, as before observed, that every fixed star is so also as well as the planets by which they are attended. It has been sufficiently proved that there is at least no impossibility which we can discover when fairly examined, to the sun's capability of supporting life, and even if we should fancy that we had ascertained the impossibi-

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made to move at the rate of twenty miles in a minute, would be 1,800,000 years in traversing this distance. Sound, the velocity of which is thirteen miles in a minute, would be more than 2,700,000 years in passing from the star to the earth; so that, if it were possible for the inhabitants of the earth to see the light, to hear the sound, and to receive the ball of a cannon discharged at the nearest fixed star, they would not perceive the light of its explosion for three years after it had been fired, nor receive the ball till 1,800,000 had elapsed, nor hear the report for 2,700,000 years after the explosion." Scientific Dialogues, Vol. II. p. 244.

* De Statu Mortuorum. Translated in the text.

lity of its doing this, the probability would be that our imagined proof rested on grounds with which our imperfect understandings were not sufficiently acquainted. We are also apt, in considering whether the stars could be habitations for living creatures, to inquire only whether beings exactly of a similar nature to ourselves could live upon them, as if it were impossible there could be any other. We admit that there are *spiritual* beings, and there may be in the universe many an intelligent race on its various orbs whose bodies may be constituted very differently from our own, which feel heat and cold according to their own peculiar capabilities of bearing these.

Besides the impossibility of our being able to discern the stars at the distance they are placed from the earth, if they shone with a reflected light, there are other reasons for believing them to be similar bodies to the sun of our own system. Some of these are thus stated by Dr. Herschel:—"That stars are suns will scarcely admit of a doubt. Their immense distance would perfectly exclude them from our view, if the light they sent us were not of the solar kind. Besides, the analogy may be traced much farther. The sun turns on its axis; so does the star Algol; so do the stars called β Lyræ, δ Cephei, η Antinoi, ο Ceti, and many more, most probably all. From what other cause could we so probably account for their periodical changes? Again, our sun has spots on its surface; so has the star Algol; and so have the stars already named; and probably every star in the heavens. On our sun those spots are changeable; so they are on the star *o* Ceti; as evidently appears from the irregularity of its changeable lustre, which is often broken in upon by accidental changes, while the general period continues unaltered. The same little deviations have been observed in the other periodical stars, and ought to be ascribed to the same cause."

Sturm, whom I have before referred to, thus expresses his opinion on the point under consideration:—"All the stars being so many suns which can give light, animation, and heat to other globes, is it probable that God should have given them that faculty for no purpose? Would he have created stars, whose rays can pierce even to the earth, without having produced worlds also to enjoy their benign influence? God, who hath peopled this earth, which is a mere speck with so many living creatures, would he have placed in the immense space so many desert globes? No, certainly: perhaps each of these fixed stars, which we see by myriads, has its worlds moving round it for which it has been created. Perhaps, these spheres which we see above us, serve as abodes for different sorts of creatures; and are peopled, like our earth, with inhabitants who admire and praise the magnificence of the works of God. Perhaps, from all these globes, as well as from ours, there rises continually towards the Creator, prayers and hymns of praise and thanksgiving."*

In the Rev. Dr. Chalmers' astronomical discourses, we find the fitness of the heavenly bodies for being the habitations of intelligent creatures, and for their being actually so peopled, thus eloquently argued:—

"The heavenly bodies appear small to the eye of an inhabitant of this earth, only from the immensity of their distance. When we talk of hundreds of millions of miles, it is not to be listened to as incredible. For remember that we are talking of these bodies which are scattered over the immensity of space, and that space knows no termination. The conception is great and difficult, but the truth unquestionable. By a process of measurement, which it is unnecessary at present to explain, we have ascertained first the distance, and then the magnitude of some of these bodies which roll in the firmament; that the sun which presents itself to the eye under so diminutive a form, is really a globe, exceeding, by many thousands of times, the dimensions of the earth which we inhabit; that the moon itself has the magnitude of a world; and that even a few of these stars, which appear like so many lucid points to the unassisted eye of the observer, expand into large circles upon the application of the telescope, and are some of them much larger than the ball which we tread upon, and to which we proudly apply the denomination of the universe.*

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* Reflections on the Works of God, by C. C. Sturm. (February 4.) Translated in the text.

"Now, what is the fair and obvious presumption? The world in which we live is a round ball of a determinate magnitude, and occupies its own place in the firmament. But, when we explore the unlimited tracts of that space which is every where around us, we meet with other balls of equal or superior magnitude; and from which our earth would either be invisible, or appear as small as any of those twinkling stars which are seen under the canopy of heaven.

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* The earth *alone* is never, in philosophical, or even in common language, called *the universe*, under which term is always included every fixed star or sun, and every primary and secondary planet throughout space, with all their various adornments.

Why, then, suppose that this little spot, little, at least, in the immensity which surrounds it, should be the exclusive abode of life and intelligence? What reason to think that those mightier globes which roll in other parts of creation, and which we have discovered to be worlds in magnitude, are not also worlds in use and dignity? Why should we think that the great Architect of nature, supreme in wisdom as he is in power, would call these stately mansions into existence and leave them unoccupied? What, although, from this remote point of observation, we can see nothing but the nakedness of yon planetary orbs? Are we, therefore, to say that they are so many vast and unpeopled solitudes: that desolation reigns in every part of the universe but ours; that the whole energy of the divine attributes is expended in one insignificant corner of these mighty works; and to this earth alone belongs the bloom of vegetation, or the blessedness of life, or the dignity of rational and immortal existence.

"But this is not all. We have something more than the mere magnitude of the planets to allege in favour of the idea that they are inhabited. We know that this earth turns round upon itself, and we observe that all those celestial bodies which are accessible to such an observation, have the same movement. We know that the earth performs a yearly revolution round the sun, and we can detect, in all the planets which compose our system, a revolution of the same kind, and under the same circumstances. They have the same succession of day and night. They have the same agreeable vicissitudes of the seasons. To them light and darkness succeed each other, and the gaiety of summer is followed by the dreariness of winter. To each of them the heavens present as varied and magnificent a spectacle; and this earth, the encompassing of which would require the labour of years from one of its puny inhabitants, is but one of the lesser lights which sparkle in their firmament. To them, as well as to us, has God divided the light from the darkness, and he has called the light day, and the darkness he has called night. He has said, let there be lights in the firmament of their heaven, to divide the day from their night; and and let them be for signs, and for seasons, and for days, and for years; and let them be for lights in the firmament of heaven to give light upon their earth, and it was so. And God has also made to them great lights. To all of them he has given the sun to rule the day, and to many of them has he given moons to rule the night." "In all these greater arrangements of divine wisdom we can see that God has done the same things for the accommodation of the planets that he has done for the earth which we inhabit. And shall we say that the resemblance stops here, because we are not in a situation to observe it? Shall we say that this scene of magnificence has been called into being merely for the amusement of a few astronomers?"——"or conceive that silence and solitude reign throughout the mighty empire of nature?" ——"We have seen one" (planet) "that its surface rises into inequalities, that it swells into mountains and stretches into valleys; of another, that it is surrounded by an atmosphere which may support the respiration of animals; of a third, that clouds are formed and suspended over it, which may minister to it all the bloom and luxuriance of vegetation; and of a fourth, that a white colour spreads over its northern regions, as its winter advances, and that, on the approach of summer, this whiteness is dissipated—giving room to suppose that the element of water abounds in it; that it rises by evaporation into its atmosphere; that it freezes upon the application of cold; that it is precipitated in the form of snow; that it covers the ground with a fleecy mantle, which melts away from the heat of a more vertical sun; and that other worlds bear a resemblance to our own, in the same yearly round of beneficent and interesting changes."——"Is it presumption to say, that the moral world extends to these distant and unknown regions?—that they are occupied with people?—that the praises of God are there lifted up, and his goodness rejoiced in?—that piety has its temples and its offerings, and the richness of the divine attributes is there felt and admired by intelligent worshippers?"*

How much more sublime an idea of the universe, and consequently more exalted impression of its Creator, do the views of this pious minister inspire us with, than if we vainly and ignorantly imagine the earth is the greatest globe in it, and the only peopled orb rolling along through etherial immensity. How contracted do such notions now appear as those of an old and zealous divine, though no astronomer—the Rev. Richard Baxter—in his "*Saints' Everlasting Rest.*"—"Yonder is the region of light! This is a land of darkness. Yonder twinkling stars, that shining moon and radiant sun, are all but lanterns hung out of my Father's house, to light thee while thou walkest in this dark world!"†

Such an assumption of our earth's position and importance in the universe was long deemed pious and a self-evident truth, but our ideas of the greatness of the works of God are expanding, and our astonishment at the vastness of his power consequently increasing. As a man who has been used to solitary seclusion feels on suddenly finding himself placed in the midst of numbers, so may those who, after considering this world the only one in creation, open their eyes to behold other peopled earths in the sky in every direction to which they can turn. We pity the simple notions of a small colony of Esquimaux, who, as related by late northern navigators, believed themselves the only people on the face of the earth, which they imagined to be all covered with ice and snow; but there is little doubt that it will soon be generally considered as short-sighted philosophy to look on our little world as the solitary exertion of the Almighty's skill in constructing such a dwelling. In further contrast to the foregoing exclamation of Baxter's, I cannot refrain quoting some passages from the beautiful *Hymns to the Supreme Being*, by the late Edward King:*—

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* Dr. Chalmers' Sermon on Modern Astronomy.

† Chap. XVI. § 11.

"Innumerable worlds stood forth, O Lord, at thy command; and by thy word they are filled with glorious works.

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* Published anonymously in 1780, and acknowledged by the author in the edition of 1798.

"Who can comprehend the boundless universe? or number the stars of heaven?

"Are they not habitations of thy power? filled with manifestations of thy wisdom and goodness?

"Amidst them thou hast provided a dwelling for man; that he also might praise thy name.

"The sun shineth and is very glorious, and we rejoice in the light thereof.

"Many worlds are nourished by it; and its glory is great. By its influence the earth is clothed with plenty, and the habitation of man is rendered exceedingly beautiful.

"We admire its brightness, and perceive its greatness, and our earth vanisheth in comparison with it.

"Yet what is this amidst thy works? is it not as a point, and as nothing in the firmament of heaven?

"What, then, is man, that thou art mindful of him? or the son of man, that thou visitest him?" *

Soon after the publication of Dr. Chalmers' Discourses, an anonymous work appeared in the form of

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* From Hymns 1st and 3d. It appears clearly, and to demonstration, from the observations made in the Philosophical Transactions (Vol. LVII. p. 234.), that the solar system itself becomes as a mere point when its relative magnitude is compared with the immensity of the universe.

letters, addressed to a friend,* avowedly "hastily written," but displaying not a little research, and with a specious reference to the differences of opinion on astronomical observations even among several celebrated astronomers, some of these observations being founded on by many; as fundamental *data* on which they build the great probability of the stars and planets being habitable and really inhabited worlds. This author, while animadverting on the reasons which Dr. Chalmers gives for his belief in there being many other residences for living beings besides our earth, and that these worlds are, in thousands of instances, within our view, expresses "surprise at the *learned credulity*" of the Reverend Doctor, and wishes to show his own superior wisdom in rejecting what he calls so wild an idea: in no measured terms he endeavours to bring under the smile of those as ignorant as himself all who, like Dr. Chalmers, give, as he alleges, their "ready credence to every novel speculation." The work of the French philosopher before noticed, says this unknown writer "has given a tone to all the modern systems of astronomy, and every child is now taught to admit these conjectures and romantic effusions as absolute truths completely within the sphere of mathematical demonstration." In another place, he characterises "the fashionable system" of astronomy (as he terms it) as made up of "theories fit only for the nursery, or speculations that might adorn the pages of Gulliver, and embellish the wonderful atchievements of the renowned Don Quixote." The discoveries of Sir William Herschel are denominated proofs of "the wildness of speculation," and this great practical astronomer (much better entitled to credit than a mere *theoretical* one), when stating the deliberate conclusions he had come to after many years, night after night, looking into the heavens with the largest and most powerful telescope which has ever yet been made, is called "a daring pretender," while along with him, under this appellation, are classed all others who, in the exercise of their own observation and judgment, draw similar inferences.

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* "Plurality of Worlds; or Letters, Notes, and Memoranda, philosophical and critical, occasioned by 'a Series of Discourses on the Christian Revelation, viewed in connexion with the Modern Astronomy, by Thomas Chalmers, D.D.'"

All such abuse and high pretensions to discernment, especially in an unknown author, would require little notice or refutation; but he also refers to certain specific astronomical points which do deserve to be examined, and, although very few indeed have gone the length of publishing such an attempt at refutation of the great truth now endeavoured to be established (as far, at least, as our present knowledge extends), yet as some learned men appear to agree in the opinion that the planetary or starry bodies are not of the nature of worlds, the objections stated by this writer may be used as texts whereon we may comment; and those unable of themselves to bring forward any scientific arguments for disbelief or otherwise, will see more clearly the nature of the arguments on both sides.

One reason for our believing the planets to be peopled is, as has been before pointed out, their vast size; and their appearing as they do, at the distance all admit them to be, proves this incontestibly. The sizes and distances from the sun and from each other of the principal planets of our system, are now past question, in the opinion of all astronomers, and it is no reason against the truth of these measurements, that *the fixed stars* have as yet been found beyond all our attempts at ascertaining how far off they are placed. As to the sizes of some of the latest discovered planets, several of the best observers are at variance; but neither is this a reason for doubting the result of their observations on the others, for these little planetary bodies are so diminutive, and their real surfaces hardly distinguishable with precision in the halo or glare of light which is reflected from them; one observer has been led to differ from another as to their sizes, by perhaps including a part of this light in what he conceived to be the solid body of the planet, but the bodies of the great planets are much better defined, indeed, with quite sufficient distinctness for ascertaining their actual surfaces and consequent bulks, no doubt of which can remain in the mind of any one who has a proper opportunity of examining them in a scientific manner.

With regard to the fixed stars, the single indisputable fact, that they appear always of the same size to us, although the earth, in the course of its yearly circuit round the sun, is 180 millions of miles nearer to them at one time than at another, is sufficient of itself to establish this prodigious distance and bulk. Their *seeming* to us, along with the planets, to be vastly nearer when we stand at a considerable elevation above the common surface of the earth, is no cause for doubting those observations on them, made when looking at them through a much denser atmosphere; for astronomical observation on the top of the highest mountains or in the clearest air gives us the same result as to distance and bulk. The weight or denseness of the atmosphere in the particular place of observation being always found and allowed for, cannot, therefore, "confound the greatest astronomer," as our author imagines, although it very probably might that of this anonymous Commentator on what he plainly does not understand. A stone at the bottom of deep clear water may *seem* nearer to the eye than if that water was dark or muddy, but if we wished to judge of the real distance of the stone, the state of the water would, of course, require to be taken into account. In astronomical observations we do not depend much on what seems to the eye, at a glance, to be the case. There is scarcely a star, for instance, which can be reckoned on as being really in the direction it appears to be; atmospheric refraction is allowed for, which bends the rays proceeding from them, making them appear, therefore, in a different direction from the true one. The swiftness of the earth's motion, and our consequent change of position, even whilst making our observations on the heavenly bodies, from its being accurately known and allowed for, can be no source of error, and, in proof of this, it is sufficient to notice, that all our calculations of the positions of these bodies with regard to the earth and to each other at certain future times are daily found to be correct when these times arrive. Assuming as true a specific motion of the earth in a circuit round the sun, and calculating on it as an essential part of the *postulata* necessary to be determined before any calculation can be made of the future positions of any of the heavenly bodies, we find that our conclusions are right to an instant of time, and so great is now the perfection of astronomical knowledge, that we can calculate with the utmost exactness the moment that any planet shall occult (seemingly pass over) a fixed star. Founding always on the motion of the earth, and on the various degrees of swiftness in that of all the planets, unerring calculations are made of the relative positions of all of them at any given time. On these calculations the sailor confidently relies for the safety of his vessel, and is never deceived, except when owing to some palpable blunder of his own or of the astronomer who gave him the calculation; but this now so seldom happens, that the possibility of it is scarcely worth noticing. All this proves that we do know most accurately both the distances and rates of motion of all the visible planets.

The author whose arguments we are considering, places great stress on the admitted difficulty, or rather impossibility, of obtaining what is called the angle of parallax of the fixed stars, and our consequent inability to discover their distances. But this only shows that the diameter of the earth's orbit (which is used in calculating parallax) bears no sensible proportion to the distance of the stars, which most probably can never be ascertained while we are on earth, but we can satisfactorily demonstrate that were any of them within a certain nameable space, their distance could be known by our being then able to measure the angle of parallax which they would be found to subtend. This distance is perfectly sufficient to establish their great remoteness, their bulk, and their shining by a light of their own, which is all that astronomers contend for as fact. With regard to the planets, however, their angles of parallax are not immeasurable, and the variances in their measurements, noticed by our author, arise from comparing old observations by imperfect instruments with those of the present day, the accuracy of which cannot be justly doubted. In our present inquiry it would be sufficient that both the stars and planets are at distances at which, if our earth was placed, it would appear no larger than they do, and this could be easily determined by the common rules of optics and perspective. If this be allowed, and it is perfectly evident, the capability of their being inhabited in as far as *bulk* is concerned is undeniable. The same author refers to the disputes among eminent astronomers as to the height of the lunar mountains, as another proof of the uncertainty of our knowledge regarding bodies at the immense distance at which even the moon is placed, but allowing that we have no sure means of measuring their height, this cannot throw discredit on the belief that they are great projections on the moon's surface, and if so, then they must be denominated mountains, at least, whatever their exact height be; that they really are so, no person who ever glanced at them through a good telescope would doubt for a moment; not only do they cast shadows as all projections do on the earth when the sun is not shining perpendicularly on them, but the tops of some of them are plainly seen illuminated, while their bases are hid from us by the darkness when the moon is in her quadratures, just as our own mountains are when the sun is rising on them.

Dr. Chalmers is desired to recollect "that if space has no termination, he is fast verging into the very gulf of atheism," but *how* this appears, is not shown —certainly it is not deducible from the Holy Scriptures, and no more sustains a charge of atheism than an assertion that the power of God is unlimited as his universe—boundless as the space into which with our telescopes we observe orb beyond orb in apparently endless succession. He who would bound space because its being unlimited surpasses the limits of his own understanding, thinks little of the absurdity he seeks to establish, or *the nature of such boundary*, but it would be of no use to notice further the opinions of an author who even doubts the truth of the motion of the earth and of the Copernican system.

Dr. Olinthus Gregory thus argues for the same conclusion as that of Dr. Chalmers :—" As there is a general analogy running through and connecting every part of the creation into one grand whole : and as there is undoubtedly an absolute similarity between the earth we inhabit and the other planets in our system ; can it be unreasonable to suppose that they and the planets of other systems have plants and trees, herbs, fruits, &c. as we have ? Or is it repugnant to nature to imagine that they are inhabited by animals and rational creatures ? Among numberless arguments which might be adduced, a very good one to show the great probability of the planets being inhabited, is derived from the following consideration. There is no part of matter that we are acquainted with, which lies waste and useless ; seas, lakes, and rivers teem with living creatures ; mountains and valleys ; trees and herbs ; grasses and animals which feed upon them ; nay, even the blood and humours of the animals themselves, all have their respective inhabitants. Surely, then, the most numerous and large bodies in the universe are furnished with beings adapted to their several situations. What an august conception does this give of the works of the Creator! Almost more than the human imagination is able to conceive. Millions of suns at immense distances from each other; attended by tens of millions of worlds moving round them, all in rapid motion, yet regular and calm: and these, we may safely infer, are inhabited by millions of millions of rational creatures formed for endless felicity."*

In a recently-published system of astronomy by Sir John Herschel, this indefatigable observer of the heavens expresses, in several places, his belief in, at least, all the planetary bodies being inhabited; but, I am sorry to find, he devotes no part of his investigations exclusively to ascertain how far the discovered facts of astronomy tend to induce a belief that there may be many such inhabited worlds as our own, although he seems, at the same time, to entertain no doubt of the reality of this supposition. "The sun and moon," he says, "which appear to untaught eyes round bodies of no considerable size, become enlarged, in the imagination of the astronomer, into vast globes—the one approaching in magnitude to the earth itself, the other immensely surpassing it. The planets, which appear only as stars somewhat brighter than the rest, are to him spacious, elaborate, and habitable worlds ; several of them vastly greater and far more curiously furnished than the earth he inhabits, as there are others less so ; and the stars themselves properly so called, which, to ordinary apprehension, present only lucid sparks or brilliant atoms, are to him suns of various and transcendent glory—effulgent centres of life and light to myriads of unseen worlds."——"To what purpose," asks the same author, when speaking of the stars, "are we to suppose such magnificent bodies scattered through the abyss of space ? Surely not to illuminate *our* nights, which an additional moon of the thousandth part of the size of our own would do much better, nor to sparkle as a pageant void of meaning and reality, and bewilder us among vain conjectures. Useful, it is true, they are to man as points of exact and permanent reference ; but he must have studied astronomy to little purpose, who can suppose man to be the only object of his Creator's care, or who does not see in the vast and wonderful apparatus around us provision for other races of animated beings." *

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* Lessons, Astronomical and Philosophical, p. 74.

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* Treatise on Astronomy. Cabinet Encyclopædia, pp. 2. 380.

Although we cannot even make an approach to ascertain the sizes of the fixed stars, unless we knew their distances from the earth, and this is beyond all calculation, yet we do know that they must be vastly farther than the most distant planet of our system, and therefore must be greatly larger, besides shining with a light of their own, and no facts are better established in astronomy, than that the visible planets are worlds in magnitude, and that the stars must be far greater than they.*

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* "When we speak of the comparative remoteness of certain regions of the starry heavens beyond others, and of our situation in them, the question immediately arises, What is the distance of the nearest fixed star? What is the scale on which our visible firmament is constructed? And what proportion do its dimensions bear to those of our own immediate system? To this, however, astronomy has hitherto proved unable to supply an answer. All we know on this subject is negative." That is, that they are not within a certain prodigious distance, otherwise their distance could have been ascertained. Astronomy furnishes sure means of measuring the various distances between the bodies of our solar system, but between the remotest orb in that system and the nearest fixed star "there is a gulf fixed," as Sir John Herschel observes, "to whose extent no observations yet made have enabled us to assign any distinct approximation, or to name any distance, however immense, which it may not, for any thing we can tell, surpass." Herschel's Treatise on Astronomy, p. 376.

From the many facts which the science of astronomy has disclosed to us, as now considered, and from the reasonings of those eminent writers here adduced, there are few who will not agree in the belief they contend for, but the presumption that they are right, may be still further established by an examination of those arguments which would seem at first to lead us to a contrary opinion. It would not be worth while to enter into a dispute on this subject with those who think their own judgment ought to settle the point in the negative, without a reference to any real ground of disbelief; but those who give *reasons* founded, or pretended to be founded, on a knowledge of astronomy, must be fairly met and their objections investigated. It is not, however, often that we can have to engage in such a contest, since astronomy affords few grounds, indeed, for scepticism on the question, and it is seldom referred to as supplying facts which refute the idea, but its discoveries are sometimes so misunderstood that mistaken conclusions have been founded upon them.

An opinion which I shall refer to as differing from those we have just been discussing, will be found in a work already quoted, written by Mrs. Somerville. This lady does not go so far as to be positive that the planets and stars cannot be inhabited by *some* kind of beings, but evidently intends to argue that they are either great desert worlds of frozen solitude, or too hot to admit either of animate or inanimate life in material bodies. "The planets," says Mrs. S. in the introduction to her treatise on the *Mechanism of the Heavens*, "are so remote, that observation discloses but little of their structure, and although their similarity to the earth, in the appearance of their surfaces, and in their annual and diurnal revolutions, producing the vicissitudes of seasons, and of day and night, may lead us to fancy that they are peopled with inhabitants like ourselves; yet were it even permitted to form an analogy from the single instance of the earth, the only one known to us, certain it is that the physical nature of the inhabitants of the planets, if such there be, must differ essentially from ours to enable them to endure every gradation of temperature from the intensity of heat in Mercury to the extreme cold that probably reigns in Uranus."*——"In Uranus the sun must be seen like a small but brilliant star, not above the hundred and fiftieth part so bright as he appears to us; that is, however, 2,000 times brighter than our moon does to us, so that he really is a sun to Uranus, and probably imparts some degree of warmth. But if we consider that water would not remain fluid on any part of Mars, even at his equator, and that in the temperate zones of the same planet even alcohol and quicksilver would freeze, we may form some idea of the cold that must reign in Uranus, unless indeed the ether has a temperature. The climate of Venus more nearly resembles that of the earth, though, excepting perhaps at her poles, much too hot for animal and vegetable life as they exist here; but in Mercury, the mean heat arising only from the intensity of the sun's rays, must be above that of boiling quicksilver, and water would boil even at his poles.* Thus the planets, though kindred with the earth in motion and structure, are totally unfit for the habitation of such a being as man."†

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* Mercury and Uranus are the one the nearest, and the other the farthest from the sun of the system of which he forms the centre.

Were any of the planets so excessively hot and others so cold as is here taken for fact by Mrs. Somerville, it would be a strong ground against a belief in their being fit habitations of living creatures of at least a material nature in any degree similar to ours; but it proceeds on the assumption that they are all of a temperature in a direct ratio according to their distances from the sun; and, if this be not the case, the inferences drawn from such extremes must fall. I shall consider the probability of this presently.

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* This particular acquaintance with the climates of the planets is less likely to be founded in reality than that of the ancients with regard to those of the torrid and frozen zones of this earth, and they were greatly mistaken in some of their conjectures.

† Prelim. Diss. p. 58.

The next author whom I shall notice, whose opinion is against there being any habitable globes but our own, is Dr. E. Walsh,* who, in a paper published in *The Amulet* of 1830, strongly discredits such a probability; but, besides founding his belief on some wrong ideas of the planetary bodies, his reasons, when they are strictly examined, amount to little more than that the planets are desolate, and not intended to support life, because he cannot understand how their Creator could have adapted them to this purpose. Now, although this may be very true in so far, yet the reason may be, nevertheless, a very inadequate one.

Before deciding on several such important points as Dr. Walsh has done, it is necessary for a person either to be himself a practical and scientific observer of the heavens (having powerful instruments), or to believe those who are so, when their eminence entitles them to credit, upon asserting what they have actually seen with their telescopes.

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* "Physician to his Majesty's Forces."

In the first place, it is objected by the Doctor (and by Mrs. Somerville also), that some of the planets are not of the proper temperature to support life. The wisest in the ancient world, in the same way, believed that the torrid zone of the earth could not be inhabited from its insupportable heat; and, on equally well founded supposition, that the icy regions were too chill for the blood of life to circulate; yet we have found that the hottest and coldest countries swarm with living beings of all kinds both on the land and in the water. The heat of the blood in man is about the same degree all over the world, and this Nature effects by simple but admirable contrivances. The African exists in full vigour in his deserts, where the heat of the sand would blister the feet of Europeans, and the hot winds blow as if from a furnace; while the Greenlander creeps into his cavern of snow, happy in the luxury of his rude lamp and bear skin, the frost freezing the sea around him with a more powerful influence than is ever felt in regions more favoured by the sun. Even Britons, in a very late instance, have been able to live during a long winter in a cave in the snow, and to spend no less than four winters in these frozen latitudes. Captain Ross and his crew, though they might not be able to convince the natives of Ashantee, or any nation sweltering under the powerful influence of an African sun, that water could become solid like glass, or that there is such a substance as snow, which falls so as to cover the ground like salt, and that huts are built of it for habitation, yet we, who have seen some of these phenomena, believe many wonderful stories of the powers of life in resisting intense cold. Man has been known also to support life for a while in an oven heated to 325°, and yet the heat of the body has kept much the same as usual (or about 96°), from the perspiration carrying off the superabundant heat by evaporation. In breathing air, too, the *denser* it is, more heat is given out by compression in the lungs, and when very rare (or light), the heat it thus imparts to the body is but little. The hotter that air is, the more rare it becomes. In the book of Daniel we find that the power of God enabled three human beings even on earth, to remain in the midst of a "burning fiery furnace," and to come out wholly unharmed. In our own day, and without any miracle, we have seen a man (Mons. Chabert) go into a strongly heated oven, and handle fire without hurt, in a manner which many would be ready to say was impossible, if they had never seen it or heard of its being done.*

Dr. Walsh might have argued that it was impossible for any breathing animal to live under water, if he had not known of amphibious creatures who could remain as well in the water as in the air, inspiring the air at one time as land animals do, and at another time similar to fishes. Even many fishes have contrivances for breathing without coming to the surface, as some of them are frequently obliged to do for this purpose. Some fishes, such as eels, can come out of the water and glide over the ground; one kind can climb trees,* and others rise out of the sea and fly in the air like birds. There are plants fitted for all manner of soils and climates, dying when removed from them—animals for all different situations, modes of life, and subsistence—all in consequence of contrivances in their nature, simple *when known*, but generally beyond all human conception, if we had not been made acquainted with the mode from the evidence of our senses. There are pestilential places where man soon dies if obliged to remain, and yet these are adapted to maintain in life and vigour many different kinds of animals. In the hottest parts of the earth the natives are dark coloured, which, at first view, would seem less adapted to withstand heat than *white*, the latter being well known to reflect, or throw back the heated rays, while the first, as it were, drinks them in. The superficial observer, however, would be wrong in his inference, for Nature has acted wisely. It has been found, from a series of experiments by

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* "There may be real appearances of *fire* and *flame*, as well as of brilliant colours emitted, and of light, even on earth, without any real heat or burning; which is manifest, not only from the appearance of the chariot of fire, and of the multitude of horses of fire, which, we are informed, were, on a certain occasion, round about Elijah, and which were also seen by his servant as surrounding them both; but it is, moreover, manifest from that first most tremendous appearance vouchsafed to be seen by Moses in Mount Horeb; when the fire appeared in the midst of the bush or thicket, and yet the bush was not consumed."——"Now, if such an appearance as this could exist even upon earth; and if it could be seen in the midst of the thicket, and remain there without injuring the wood of the thicket; much more may such glorious appearances be conceived to exist on the sun, without causing it to be an ignited body, burning with intolerable heat, according to vulgar apprehension. It may, therefore, well be conceived to be a glorious mansion of bliss."

King's Morsels of Criticism, Vol. I. pp. 104. 108. 8vo. ed.

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* The *Perca Scandens*, which inhabits rivulets in Tranquebar, about a palm long. By the means of the spines of its gill-covers, and the spinous rays of its other fins, it crawls up trees.

Linn. Trans. Vol. IV. p. 62.

Sir Everard Home, instituted to ascertain the power of the sun's rays, that although absolute heat, in consequence of the absorption of the rays, is greater from a black surface, yet the power of the rays to scorch the skin is thus destroyed. The negro has, therefore, a natural provision for the defence ot his skin while living within the tropics. The greater heat which would be accumulated in the body of the negro in consequence of his black skin, is carried off by a greater tendency to perspire than those have who live in temperate climates, and thus one species of the human race is wisely adapted to live and thrive in a climate which is hurtful and fatal to others ; in short, the power of the Creator in adapting a situation to its inhabitants, or its inhabitants to a particular situation, seems to be boundless ;—why, therefore, may not the stars and planets have similar adaptations to show the power and wisdom of an all-powerful Providence?

Dr. Walsh objects to the idea of the planet Mercury being peopled, from his imagining that, owing to its vicinity to the sun, it *must* be too hot ; as if (even admitting, for a moment, the greater heat) the Creator could not, by some means, adapt it to the existence of life, unless we could discover *how* it might be done, but in this instance the difficulty is by no means insuperable, even to our present comprehensions. Shall He, whose endless contrivance so skilfully adapts one thing to support another upon earth, be able to have recourse to none but what our investigations can discover around us? Is his power and creative energies displayed nowhere but here, or is this the only world on which he has exercised his wisdom? The idea of fancying the earth to have been so much attended to by its Creator above all the greater bodies which, like it, revolve through the vastness of space, can surely be entertained only by the most contracted views both in religion and philosophy.

> "Strange and amazing must the difference be,
> 'Twixt this dull planet, and bright *Mercury;*
> Yet reason says, nor can we doubt at all,
> Millions of beings dwell on either ball;
> *With constitutions fitted for that spot*
> Where Providence, all-wise, has fixed their lot." *

We should not, therefore, always suppose that, in order to support life, every thing *must* of necessity be the same in those other worlds which we see surrounding us, as on earth, and assume *it* as the standard, or that all living beings must exist by the same means as they do here, and be only able to bear the same degree of heat and cold, or that there can be no contrivance for modifying each, in the different planets at least, when there are so many direct and admirable ones displayed before our eyes on earth, where only we can observe them. The materials of which the planets are made may have a greater or less tendency to absorb the heat of the sun, and we know that almost every different substance within our reach has a peculiar absorbent power or nature of its own.. At the distance of about six miles from the earth, the air is so light that it would be unable to support human life. Being a compressible fluid, it is, of course, densest at the surface of the ground on a level with the sea, or at the bottom of a mine, and it seems capable of receiving a greater or less degree of heat from the sun according to its density, at the same time that heat imparts to its particles a greater repellant power, and thus the otherwise intense degree of heat is prevented. The higher we ascend, the colder does the air become, because we recede from good reflecting surfaces, and are surrounded by air which can receive but little warmth from the rays which pass through it. It is a modern and very plausible theory, therefore, that heat thus depending in a great measure on the particular density of the air as well as the capability of the body on which it strikes to receive it—the atmospheres of the different planets may be more or less dense, and their bodies, in short, of such natures as to have propensities to absorb the heated rays, according to their distance from the sun, *and thus the heat of all of them may be regulated to the same degree.*

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* Baker's Universe.

Because the planet Jupiter* turns round on his axis faster than the earth does, Dr. Walsh infers this must be a reason against his being inhabited, since any thing moveable must be thrown off. That is to say, philosophically speaking, that the power of gravity of this planet is not sufficient to overbalance his centrifugal force; but their relative powers in these respects are not once adverted to by Dr. Walsh! As gravity acts in proportion to the quantity of matter of a body, Jupiter must be able to exert a far greater power in this way than the earth, over whatever is on his surface or neighbourhood; and, therefore, if he is inhabited, his people would perhaps have less tendency to be whirled away than we ourselves, from his greater gravity attracting them more in proportion than his rotatory motion would tend to counteract or overpower—supposing these planetarians of the same weight with us. There are many relative particulars with which we must be acquainted before we can pronounce what effect the same rapid diurnal revolution of another planet would produce on its own surface. The inhabitants of Jupiter may not have even yet discovered that their globe turns at all, since we were some thousand years in ignorance of our own earth's motion in any way. If they have arrived at the same knowledge of their swift moving habitation as we have of that of the earth, they may still be as little sensible of any rapid rotation as we are; the earth turning with great velocity on its axis, and flying forward in its appointed orbit round the sun at the rate of 68,000 miles in an hour.

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* Professor Airy, by a masterly process, has determined the mass of this planet by observations of the elongations of the 4th Satellite, and he finds that it is more than 322 times greater than the earth.—White's Ephemeris. 1834.

The *density* of Jupiter is not so great as that of the earth, therefore his *bulk* is much more than 322 times that of our planet, being, in fact, 1,500 times greater in bulk than the earth.

The earth turns round its axis in twenty-four hours, or the whole visible universe, sun, planets, and fixed stars, all move about it in the same period; either of which movements would produce the appearances we daily observe. The one is simple and easy to comprehend; the other, when we consider the magnitude of even a few of the celestial orbs and their distances, is beyond all rational belief by any person competent to form a judgment. As it is absurd, therefore, to suppose the earth is at rest while the universe moves round it, the globe on which we live *must* be held to revolve as described, for there is no third opinion which can be formed on the question. Should the idea of the earth's moving as it has been described to do, be called improbable, then it must be allowed by those who think so, as an inevitable consequence, that the whole of the heavenly bodies move inconceivably *faster*; in proportion as they are distant from the earth, so in the same proportion would be the rapidity of their movements. The sun, on this supposition, would move at the rate of 414,000 miles in a minute! and the *nearest* stars at the rate of 1,400 millions of miles in a minute!!

Dr. Walsh proceeds mainly on the assumption that none of the planets have *atmospheres*, and so would be unable to support life of any kind. Many observations, however, induce us to think otherwise. The planet Mars generally appears so cloudy, that we can seldom get a clear view of his body, which always looks of a dusky red, the reason of which would seem to be, that the rays of light which he reflects must come through a dense air, as those of the sun and moon do when seen by us while rising and setting, and consequently shining through the densest part of the earth's atmosphere. An eminent astronomer thinks this ruddy colour "indicates an ochery tinge in the general soil of the planet, like what the red sandstone districts on earth may possibly offer to the inhabitants of Mars, only more decided." But there is no surface on the earth of any extent worth mentioning, which could reflect its colour to such a distance; and the first reason given for the red appearance of Mars seems much more likely and better able to produce the effect than the other.

Sir John Herschel says that the probability of an atmosphere round this planet is greatly increased by "the appearance of brilliant white spots at its poles, which have been conjectured, with a great deal of probability, to be snow, as they disappear when they have been long exposed to the sun, and are greatest when just emerging from the long night of a polar winter." The same astronomer adds, that "in this planet we discern, with perfect distinctness, the outlines of what may be continents and seas." The light of a fixed star has been observed to be refracted, and to become fainter when passing near this planet, which must have been caused by his atmosphere. A white or bright appearance has been distinctly seen extending at his poles in their respective winters, and lessening in their summers, and this we certainly have strong reasons for believing to be *snow*, which cannot be produced without air; so he must have clouds and rain also. Sir James South gives an account of some late observations of his own as corroborative of a conclusion he had formerly come to, namely, that no indication now exists of an atmosphere being attached to Mars.[*] A star, he says, retained its light blue colour, its full brilliancy, and comparative steadiness till the very instant of its occultation or disappearance behind the body of the planet. At its emersion, it was seen nearly dichotomised, or apparently cut in two, which seemingly showed that it was going so sharply behind the planet that it was not suffering any distortion by an atmosphere surrounding Mars. Sir James concludes that either some physical change has occurred in the atmosphere of the planet, or that the observations of Cassini and Roemer were inaccurate. There are, however, circumstances sometimes attending occultations, particularly of stars by the moon,[†] which render our inferences as to any of these rather uncertain, peculiar attendant phenomena being seen at one time, and not at another, from single observations or at certain times. When we reflect that the atmosphere of the earth ceases to refract at the height of 47 miles from its surface, and that the earth's diameter is 8,000 miles, so small a height beyond its surface would not be easily detected by an observation from any of the planets, and very accurate and minute inspection is required to discover a refracting atmosphere on them. As their several atmospheres may vary in their densities at different times as ours does, we can easily see how they may be more readily distinguished by their effects at one time than another. The celebrated Schroeter asserts, that he has had satisfactory proof of an atmosphere both as surrounding Mars and Venus; the densest part of that belonging to the latter being about 16,000 feet high. He also affirms that he discovered mountains on this beautiful planet, one of which is ten, another eleven, and another twenty-two miles high. The variable belts and cloudiness of Jupiter seem to be accountable for in no other way than as owing to changes depending on an atmosphere. These belts are supposed, by Dr. Brewster, to be clouds thrown into parallel strata by the rapidity of his diurnal motion, forming regular interstices, through which are seen the opaque body of that planet. Stars are also refracted when passing near him. Saturn likewise has belts, and two prodigious flat rings, all surrounded by a dense atmosphere, the refraction of which may account for the irregularity apparent in his form: his seventh satellite has been observed to hang on his disc more than twenty minutes before its occultation, showing, by computation, a refraction of two seconds, a result confirmed by observation of the other satellites. "An atmosphere so dense," observes Mrs. Somerville, "must have the effect of preventing the radiation of the heat from the surface of the planet, and consequently of mitigating the intensity of cold that would otherwise prevail, owing to his vast distance from the sun."* A knowledge of such a wise contrivance for lessening the cold on this distant world, should have induced this fair authoress to have less confidently asserted, in another place, that the cold there must prevent the subsistence of animal life; or, at least, not to speak as if the temperature of the planets must be entirely regulated by their distances from the sun.

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[*] See a Letter addressed by him to the Duke of Sussex, of date Nov. 1832, inserted in the Transactions of the Royal Society.

[†] See Memoirs of the Astronomical Society of London, Vol. II. p. 457.

It might be imagined that, from the vicinity of the moon, we should be able to decide with a greater certainty than with regard to the planets, whether this useful attendant on the earth has an atmosphere; but, at the same time, that the fact is ascertained with sufficient precision, very accurate and minute observation indeed is here required to detect its existence, from the limited extent of it precluding, at such a distance, so satisfactory a proof as might be wished. Certain phenomena observed by scientific men, lead them to infer that these must proceed from air surrounding the moon, but that it exists only to a short distance from her surface. The dense part of it does not exceed 1,500 feet, and the height where it could affect the rays from a star is not above 5,740 feet. When the moon is horned, a sort of twilight appearance is seen at the cusps (or horns), which some of the most eminent astronomers have ascribed to an atmosphere, and assured us that they have found stars to be refracted when occulted by her; that is, in passing behind her, and just before obscuration.

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* Mechanism of the Heavens, p, 400.

Dr. Herschel tells us that, with his great telescope, he actually saw a red appearance upon the top of a mountain on the moon, as if it had been a volcano during an eruption, and several other astronomers have joined in the opinion from their own observations; they have also remarked a vivid light upon the dark part of the moon's surface, which was evidently not derived from the sun, as the part was turned from him at the time, and this appearance they naturally attributed to the reflection of a volcanic eruption. Indeed, the many round crater-like appearances which the telescope enables us to perceive on this planet lead us to suppose that they owe their origin to fire, from the resemblance to burning mountains on earth, though ours are on a much less scale. Had there been none such on our planet, the idea of their possibility would probably have been treated with ridicule; but, as the earth not only vomits forth fire and red-hot solid matter from about 200 openings, and also boiling water to a great height, so we must at least allow the *possibility* of the moon doing the same. That changes are sometimes seen to take place on the moon's surface, appears undeniable from various observations. Schroeter relates that, on the 30th September, 1791, with a reflecting telescope, he perceived the commencement of a small crater on the declivity of a volcanic mountain in the moon, or one there from whose general appearance this origin might be inferred. On the 11th of January following, upon looking at this place again, he could neither see the new crater nor its shadow. Again, in 1792, he perceived a central mountain of a clear grey colour, of which, during many years, he had discovered no trace.* D. Ulloa observed a small bright spot in 1778, which appeared to him like as the light of the sun shining through an opening in the moon. Captain Kater (a name well known to science) discovered the same spot in 1821, and which he has no doubt of being the same with one of three volcanoes, whose eruptions are recorded in the Philosophical Transactions, as having been seen by Herschel in 1787, one of which, he said, showed "an actual eruption of fire or luminous matter."

Fire cannot subsist without air, and we have other apparent proofs of burning mountains in the moon than the shape of them and red appearance at particular times. Many believe, from certain considerations, that the meteoric stones, or aerolites, as they are named, which now and then fall from the air upon the earth, have come from lunar volcanoes. They are all of one species of matter, being, for the most part, metallic, like an ore of iron, but of constituent proportions unlike any terrestrial mineral. Their fall is generally preceded by a luminous appearance, a hissing noise, as of a body passing swiftly through the air, and a loud explosion. When found immediately after their descent, they are always hot, but whether the heated state accompanies them all the way from their source, or is only acquired by the rapidity of their motion through the air which surrounds the earth, we know not. Their size differs from small fragments of inconsiderable weight to the most ponderous masses. Some of the larger portions of these stones have been found to weigh from three hundred pounds to several tons, and they have often descended with a force sufficient to bury themselves deep in the ground. They have fallen at too great distances from any earthly volcanoes, to be believed to come from them, and no such stones have fallen in the neighbourhood of any of our known volcanoes. Professor Pallas discovered a large mass of meteoric iron on a hill in Siberia, which was considered by the natives as a holy relic that had fallen from heaven. A still larger was seen by Bougainville on the banks of the Plata, which was calculated to weigh a hundred thousand pounds. A mass of native iron was found some years ago in the district of St. Jago del Estro in South America, without any rock or mountain near it, and was supposed to be thirty tons weight. Captain Ross gives an account of two large masses in Greenland, of which the Esquimaux made their knives.

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* See Transactions of the Society of Natural Philosophy at Berlin.

The relations of the fall of smaller pieces in every country of the world are too numerous to be here further detailed.

The gravity of the earth, acting on every projected body rising out of any of its volcanoes from the moment it rises, the power to throw a stone from any point of this globe whence it is possible that it might be projected—to the distance we find these aerolites, would be prodigious, and far beyond what any earthly explosive force is here known to exert. As the moon's power of attraction extends to us, and is shown to be so powerful as to influence the motion of the waters of the sea—a great wave (which we call *a tide*) following her motion round the earth—ours, of course, reaches to her, exerting on her surface greater power than what she can do with us, from the earth being so much larger than the moon. Thus the attraction of the earth influences, in some degree, all moveable bodies on the moon's surface or projected from it. A volcano here, which could throw bodies to such a distance as these singular rocks are found from any of our burning mountains, would scatter ruin and desolation in a vast circle around it; but we are acquainted with none such, with not one whose sphere of action extends beyond a few miles, except when their dust is carried farther by the wind, which has dispersed it more than two hundred miles from the mountain which ejected it.

It has been computed that, if a stone was projected from the moon in a vertical line with an initial velocity about four times that of a cannon ball as it leaves the gun, instead of coming back to the moon by the attraction of gravity, it would come within the sphere of the earth's attraction so as to bring it to the ground.

The mountains of the moon, in general, appear to be higher than those of the earth.* We may, therefore, naturally suppose a volcano there to have a greater projectile force than ours, or one sufficient to send a stone so far beyond the retaining gravity of the moon, and as she is so much smaller than the earth, this force need not be so great as would be required to produce the same effect with regard to an earthly volcano.

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* Astronomers differ as to the height of these mountains, Herschel making them only from three-quarters of a mile up to a mile and a-quarter, while Schroeter computes them to vary from four to seven miles high; and this last would appear to be the most accurate, when we consider the great appearance which they make and the extent of the shadows which they cast when viewed with a high power. Taking this in conjunction with their being at a distance of 240,000 miles, and that the planet is reckoned to be 2,000 miles in diameter—if the mountains on her surface referred to were so low as a mile, they could not appear so large as they seem: when we compare, therefore, their relative proportions to the known diameter of the moon, seven miles would not seem too high an estimate for some of those, in particular, on a fine looking and lofty ridge which has been named the *Appenines*. The two thousandth part of the moon's disc would be very minute

Some have fancied these stones to have been created in the air by some mysterious and unexampled process, or to be the wandering pieces of broken planets; and there are other ingenious theories respecting them, but the one here explained seems to be the most probable.

We are told by Dr. Walsh that the Lunarians (if

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indeed, and an object of that height on her, when viewed from the earth, could not possibly appear to us as these do. The eye of the observer will readily allow that they are of a much greater proportion to the whole diameter than 1 to 2,000. Even were they of the same height as those on earth, their relative proportion to the moon would be much greater than ours are to this globe.

Sir John Herschel, in his recent treatise on astronomy, computes the lunar mountains to be only one English mile and three-fourths in perpendicular altitude. But whatever the height of these mountains be, every man who has looked at them through a good telescope when this planet is in quadrature, that is, when the sun is shining obliquely on it, must be satisfied that they are elevations on the moon's surface.

such there be) of one lunar hemisphere never see the sun, but bask in earth-shine. *Every* part of the moon, however, must receive an equal portion of sunshine in its turn: as the moon revolves upon her axis in the same time that she revolves round us, only one side of her can have the reflected light of the earth at any time.[*] One lunar hemisphere is never seen by us, and its inhabitants cannot view the earth without coming into the part which it illuminates. The remoter hemisphere has its day a fortnight long, and this is followed by a night of the same length, not even enlightened by a moon, while the more favoured part has the earth in full view during its long night. Those inhabitants on the opposite side of the moon to us, upon their travelling so far as to be able to see the earth for the first time, must behold with astonishment a moon exhibiting a surface thirteen times larger than their orb appears to us, and with a splendid diversity of clouds, a great variety of reflection arising from our lands and waters, woods and deserts of sand—all successively coming into view as we revolve! Those who inhabit the centre of the full moon always see us directly over their heads, and, from whatever part of the moon's surface the earth is seen, we never appear to the inhabitants to change our position in the heavens, as we do not rise and set to them as they do to us, but the earth must appear to them to have its phases, to be gibbous or horned, and to put on all the appearances which the moon assumes to our view.*

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[*] This may be familiarly illustrated by one person standing in the middle of a room, and another going round it, side foremost, still looking at the person in the centre. The one who goes round the room, as effectually turning round as if he did so on his heel, but more slowly.

Maps of the Moon are only representations of her appearance as seen through a telescope of considerable power when the planet is in certain positions with regard to the sun; her surface having it features partly altered according as its projections cast more or less shadow, and by the different powers of reflection of the sun's light with which the various portions are endued. When these projections are directly *opposite* to the sun, there is, of course, no shadow, but when the moon's surface lies obliquely towards him, there are seen as distinct shadows projected from prominent parts of her body as could be observed thrown by our mountains and heights, and seen by a spectator at the same distance from the earth. Sir John Herschel, when treating of these mountains, says—"By the aid of telescopes, we discern inequalities in the surface of the moon, which can be no other than mountains and valleys—for this plain reason, that we see the shadows cast by the former in the exact proportion as to length which they ought to have, when we take into account the inclination of the sun's rays to that part of the moon's surface on which they stand."* The edge of that part of the moon which is turned towards the sun is always circular and nearly smooth, but the opposite border of the enlightened part is always observed to be extremely ragged, and indented with deep recesses and prominent points. "The mountains near this edge cast long black shadows, as they should evidently do, when we consider that the sun is in the act of rising or setting to the parts of the moon so circumstanced. But as the enlightened edge advances beyond them, that is, as the sun to them gains altitude, their shadows shorten, and, at the full moon, when all the light falls in our line of sight, no shadows are seen on any part of her surface..... The existence of such mountains is corroborated by their appearance as small points or islands of light beyond the extreme edge of the enlightened part, which are their tops catching the sunbeams before the intermediate plain, and which, as the light advances, at length connect themselves with it, and appear as prominences from the general edge."*

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* "If there be inhabitants in the moon, the earth must present to them the extraordinary appearance of a moon of nearly two degrees in diameter, exhibiting the same phases as we see the moon to do, but *immoveably fixed in their sky*, while the stars must seem to pass slowly beside and behind it. It will appear clouded with variable spots, and belted with equatorial and tropical zones corresponding to our trade-winds; and it may be doubted whether, in their perpetual change, the outlines of our continents and seas can ever be clearly discerned."

Sir J. Herschel's Treatise on Astronomy.

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* Treatise on Astronomy.

The alpine scenery of the moon is, in some parts, analogous in appearance to that of the earth, but the generality of the lunar mountains present a striking singularity of aspect. They are very numerous and generally of a circular or cup-shaped form : the larger ones have, for the most part, flat valleys within, from each of which rises a small, steep, conical hill in the centre. They offer, in short, in the words of Sir John Herschel, "the true *volcanic* character as it may be seen in the crater of Vesuvius, and in a map of the volcanic districts of the *Campi Phlegræi* or the *Puy de Dôme.*" Sir John states, from his own observations with powerful telescopes, that "in some

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[*] Herschel's Treatise on Astronomy.

of the principal ones, decisive marks of volcanic stratification arising from successive deposits of ejected matter may be clearly traced." The general surface of the moon exhibits a great variety of reflection, showing that it is somewhat different in its nature in different places, as if the sun's rays were reflected from wastes of sand, extensive forests, and land of various kinds. In many parts, also, it looks as if covered with snow of a dazzling whiteness.

A map of the moon does not pretend to define where actual land and water are, of a nature such as ours, but merely an exact delineation of what is seen on it. Lunar solids and fluids may be very different from those on earth, as well as the inhabitants, and every thing connected with the planet, if we may judge from the analogy of the endless variety which the God of Nature displays before our eyes in all countries of this globe which we dwell upon. It has been objected that, if the moon had water on her surface, or extensive collections of fluids of any kind, the attraction of the earth, particularly when acting in conjunction with the sun, would inundate the side next to us. But this is supposing that no natural contrivance could prevent such an effect. A difference of specific gravity in the waters of the moon (if fluids there be) from those of the earth, might answer the purpose of preventing their being so affected, or her seas might be so enclosed by land, and limited in extent, that the attraction of the earth may have little effect upon them. There is, for instance, little or no tide in the Mediterranean sea, or in the Black or Caspian seas, and none in the great lakes of America. It is very doubtful, however, if in fact there be any great bodies of water in the moon, for we see no such clear or bright reflections as water, like what is on the earth, might naturally be expected to produce. The parts commonly thought to be lunar water, and which, to a telescope of low power, seem quite smooth, appear, under higher magnifying powers, as if furrowed, similar to what the ripple of the retiring tide with us leaves on the sand of the sea-shore, and these are interspersed with round cavities; showing that these places cannot be fluid, which would have reflected the sun's light as if from a smooth surface.*

In Mr. Greig's elementary work on astronomy, under the title of *Astrography, or the Heavens Display-*

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* "What is extremely singular in the geology of the moon is, that although nothing having the character of seas can be traced (for the dusky spots which are commonly called seas, when closely examined, present appearances incompatible with the supposition of deep water), yet there are large regions perfectly level."

Sir J. Herschel's Treatise on Astronomy.

ed, while describing the nature and appearance of the moon's surface, he appears to have little doubt of her being inhabited. "It is admitted," he says, "by all those whose situation has afforded them an opportunity of examining more particularly the disc of the moon, that she has mountains, valleys, &c. like the earth ; her shape and motions being also similar. Therefore, may we not by analogy infer (without presumption) that she is inhabited by rational beings, who adore the Creator, and show his great wisdom, power, and goodness, as we are taught to do in this lower orb ?"

"There seems, then, but little wanting," observes another learned author, "in order to complete the analogy between the moon and our earth, except inhabitants ; it is true we perceive no large seas in the moon, and we are aware that her atmosphere is extremely rare, and perhaps unfit for the respiration of animal life ; but we also know, that if we only pluck a flower in the field, we find it, by the aid of the microscope, full of living creatures, to whom it is a world, supplying them with all the requisites for their brief existence : we cannot then for a moment suppose that the economy of nature, by which we always mean the Author of Nature, would extend itself so minutely in this instance, and leave so large a body as that of the moon without beings, having organs adapted to the peculiarities of their situation."*

"Telescopes," observes Sir J. Herschel, "must yet be greatly improved before we could expect to see signs of inhabitants, as manifested by edifices, or by changes on the surface of the soil.....No appearance indicating vegetation, or the slightest variation of surface which can fairly be ascribed to change of season can any where be discerned."†

In arguing for the probability of there being inhabitants in the moon, Fontenelle places the question in this point of view:—"Suppose there had never been any communication between Paris and St. Dennis, and one who was never beyond the walls of this city (Paris) saw St. Dennis from the tower of Notre Dame; you ask him if he believes St. Dennis is inhabited as Paris is? He presently answers boldly, No; for, says he, I see very well the people of Paris, but those at St. Dennis I do not see at all, nor did I ever hear of any there: it is true, you tell him, that from the towers of Notre Dame he cannot perceive any inhabitants of St. Dennis because of the distance, but all that he does discover of St. Dennis, very much resembles what he sees at Paris, the steeples, houses, and walls, so that it may very well be inhabited as Paris is. All this signifies nothing, the Parisian still maintains that St. Dennis is not inhabited, because he sees nobody there. The moon is our St. Dennis, and every one of us, like this Parisian citizen, who never went out of his own city."

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* Martin's Christian Philosopher. 1832.

† Treatise on Philosophy, p. 230.

The comparison, however, between two cities is a little closer than between the earth and the moon; in the latter of which we can perceive no appearance of the works of art; but the comparison holds good in their being both great globes turning on their axes, illuminated by the same sun, having diversities on their surfaces, hills, dales, with extensive plains, and none can question that it would have been as easy for their mutual Creator to have adapted the moon to support life as it was to people the land of the earth within the Arctic circle with men and animals, and its seas with fishes, as well as that beneath the equator—wonderfully contriving, by a thousand different means, that all parts on the earth shall be fitted to maintain the lives of millions, under great diversity of heat and cold, and in a vast variety of circumstances.

Before the invention of balloons, many of our wisest men pronounced it impossible for man to be able to rise into the air;—before steam boats were invented, even the great improver of the steam engine, Mr. Watt, was *certain* it would be impossible to adapt that power to answer on the waves, and yet he was better acquainted with it then than any other man of his time:—thus we are ever prone to call things impossible, until we see them done, and then wonder that we never thought on so simple a plan for bringing them about;—forgetting, too, with regard to the stars and planets being inhabited, that what seems impossible in the eyes of man, and is, in fact, so with him, is not only possible but easy with God. We may, therefore, in a future state of existence, see many things much more wonderful than this—than finding that the earth is only one of millions of inhabited worlds, instead of the sole globe of living beings, as was once imagined it must be. The time will assuredly come when we shall have ample powers and opportunities of admiring the amazing contrivances and wisdom of that good Being who has created all things—and these divine attributes we shall yet find displayed in adapting other orbs so as to support and delight his rational creatures and all the innumerable living things, regarding which, from the variety here displayed, we may even now have some general ideas.

SUMMARY AS TO THE PLANETS BEING INHABITED.

The earth is one of eleven globes revolving round the sun and turning on their own axes—one of the others being of nearly the same size as the earth, six smaller, and the rest greatly larger; in nothing which we know are we certain that this world of our own is more favoured or better calculated for supporting living creatures than any of our fellow-planets, some of which could accommodate with room a thousand times as many inhabitants as the one we dwell upon.

The earth turning as above, day and night are produced, and the different seasons of the year succeed each other upon it. By the same contrivances all the other planets must have like changes. Is it within the range of chance or possibility that they also should have such changes for no ends similar to the purposes they answer upon earth, or that what must so clearly have been planned for them by their Maker should have been without any view of supporting or benefiting either animal or vegetable life ?

The earth is surrounded by an atmosphere which answers many useful purposes, particularly of preserving both animal life and that of all vegetation. The planets have also atmospheres. Can we suppose these are for no such uses as ours?

The earth literally teems with living creatures.—It is almost unavoidable to infer that the planets, some of which are greatly larger than this globe, are not deserts of lonely stillness, or formed for no such use as the earth has been.

The earth is warmed and enlightened by the sun. So are all the planets.

The earth has a moon to reflect the light of the sun on that part of it upon which the sun does not shine at the time. The greater number of the other planets have moons likewise, and contrivances to increase the quantity of reflected light according to their distances from the sun. Does this indicate no particular design, or can we be satisfied of a design by an all-wise Creator, and yet believe that it benefits no living creatures?

From the nearest planet, the earth must appear to its inhabitants (if there are such, and if they have eyes of similar powers to ours) just as it now does to us; and they have the same reasons for concluding this planet which we inhabit to be peopled or not as we have for conjecturing so in regard to their distant dwellings.

FROM the view we have now taken of the universe, it must be admitted that, if the extent of the works of the Creator announces his infinite power, nothing can be supposed more magnificent and sublime. We see by our unassisted eyes several thousand stars, and there is no region of the heavens in which even an ordinary telescope does not show us as many as the eye can distinguish in a whole hemisphere. With great telescopes we discover new groups and clusters of them composed of countless multitudes of stars of which we saw nothing before; and thus the more perfect the instruments, the greater numbers do we find to exist in every variety of arrangement and brilliancy. The scientific imagination pierces even beyond the telescope, and has no doubt that there are innumerable worlds enlightened and filled with inhabitants, ignorant most probably of the very existence even of our solar system. It endeavours to pierce still farther, seeking for some boundary to this immense conception, but finding none. How glorious is this view of nature, and nothing short of it can be justly founded on the discoveries which we have made. Man is seemingly adapted in his present material structure to live only upon this globe. The strength of his muscles is in conformity to the size, or rather *gravity* of the earth and the body they are intended to move. The invisible but universal and constantly-acting power of gravity exerts itself by keeping him attracted to the surface of our globe; but he has strength to overcome the attraction in some degree, and does this, in so far, at every step which he takes. In a planet or star much greater or heavier than the earth, man might not be able to move a limb; and he could not there, with the same muscular exertion which he uses successfully here, overcome the power which would draw him to the body of that other world we are supposing him transported to, and he might become fixed to one spot as far as depended on his own powers of locomotion.* The strength of our different *viscera*, likewise, is adapted to the pressure of our own atmosphere; and this is no slight weight, for it bears on us with a force of 15 pounds on every square inch of the surface of our bodies, or 30,000 pounds in whole on each person. Now, if on another world its atmosphere were either greatly heavier or lighter than that which surrounds this earthly globe, our lungs would be unable to breathe, or other fatal effects would ensue from the change of density, as already illustrated.

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* "If the force of gravity were increased in any considerable proportion at the surface of the earth, it is manifest that all the swiftness, and strength, and grace of animal motions must disappear. If, for instance, the earth were as large as Jupiter, gravity would be eleven times what it is. The lightness of the fawn, the speed of the hare, the spring of the tiger, would disappear—could no longer exist with the existing muscular powers of these

The strength, indeed, of all things on earth is adjusted to what they are exposed to from natural causes. Trees, &c. are suited to resist our general currents of wind; but, if these were greatly more violent, all vegetation would be swept away. The muscular strength of all earthly creatures which live on dry land, or in the sea, or fly in the air, is also accurately proportioned to the resistance which they have to overcome, both from gravity and the density

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animals; for man to lift himself upright, or to crawl from place to place, would be a labour slower and more painful than the motions of the sloth. The density and pressure of the air, too, would be increased to an intolerable extent, and the operation of respiration, and others which depend upon these mechanical properties, would be rendered laborious, ineffectual, and probably impossible." Whewell's Astronomy and General Physics.

of the water and the air. "Now," to use the words of Mr. Whewell, "it will be very obvious that, if the intensity of gravity were to be much increased or much diminished—if every object were to become twice as heavy as it now is—all the forces, both of involuntary and voluntary motion, which produce the present orderly and suitable results by being properly proportioned to the resistance which they experience, would be thrown off their balance. They would produce motions too quick or too slow, wrong positions, jerks, and stops, instead of steady and well-conducted movements."—"The masses of the several planets are very different, and do not appear to follow any determinate rule except that, upon the whole, those nearer to the sun appear to be smaller, and those nearer the outskirts of the system to be larger."

Were the particles of air more close together or more distant, the powers of the voice and of hearing would be altered or lost. If the gravities of all the planets were as various as philosophers have calculated, and their atmospheres so likewise, both being wholly unfitted for us in our present construction, still, as has been shown, there would be no real grounds for inferring that material beings did not inhabit them, owing to an impossibility of their existing.

Our atmospheric air is well known to be compounded of different species of gaseous fluids, in certain proportions; and these proportions are found necessary, in order to support us in health. If the common air were much purer, more of oxygen in it, then it has been found to intoxicate, as it were—we should live too fast in it—our lives would be consequently shortened, were it even but a little more pure than it is. If it contained, on the other hand, a larger proportion of nitrogen gas, then it would become unfitted for animal life; for, although this last is necessary to us as one of the component parts, yet, strange to say, it is of itself highly deleterious and would prove fatal in a few inspirations. In short, our frames are contrived so as to thrive best with the exact mixture of the air which we usually breathe, and it is evidently made up for us with all the accuracy which we aim at in a medical prescription. We have no reason to suppose that, if all the planets have atmospheres, any one of them would suit us. In not one of them, most likely, could we breathe at all. But how rational is it to suppose breathing creatures adapted to live in any species or admixture of air, as well as we observe is the case in the animals destined to dwell in widely-different climates. Who can tell also, although breathing be necessary in this world to mortal life, whether it is equally so with other beings different from earthly animals?

Both animal and vegetable life depends on a certain portion of electric matter, that mysterious fluid which seems to have a constant and determinate circulation in the earth. Were this fluid either much increased or diminished, life, as now existing, could not continue. Now, unless electricity, galvanism, magnetism, or whatever name we give to this important natural agent, which acts in so many different ways, be present in the other planets, and in the exact intensity which it is on earth, life, as we experience it, could not exist on them; but beings differently constructed in their bodily frames could be reasonably imagined well adapted to bear or live under any degree of electric influence.

From all these considerations, and from others formerly noticed, we may infer that the inhabitants of other globes are in some respects dissimilar to us in their bodies or general appearance and in the manner in which their lives are supported. This must still more be believed, when we reflect on the inexhaustible stores of different forms of being and modes of existence which are exhibited before our eyes. Besides there being no two human faces here exactly alike, there is a general national peculiarity attached to the natives of each of the great countries of the earth. How great a diversity in appearance is there between the white European, the sable Negro, the swarthy Moor, the copper-coloured Peruvian, the dark Hindoo, the Chinese, the Esquimaux, the savages of New Holland and California,* both the latter being in appearance little removed from the brutes—all decidedly different in shade, and nearly as markedly so in feature! Between any inhabitant of earth and those on another planet, the distinction may be fairly supposed far greater than between any of the above, and the same observation may be drawn from similar facts, so as to apply to the whole animal and vegetable productions of each habitable world.

Thus far we are entitled to infer from analogy, but beyond such a general conclusion we cannot as yet go with the least degree of philosophic probability.

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* It may not be out of place here to remark the innate or intuitive knowledge of life in another world, which seems to have been instilled by their Maker into the minds even of the lowest in intellect of the human race. Both of these degraded nations believe in it, and in a late account of the last named, it is said that "they have a full conviction of a future existence, and expect to enjoy happiness after this life *in some delightful island in the sky*." See the Penny Magazine for 8th Feb. 1834.

THE PROBABILITY OF OUR SEEING THE INHABITANTS OF THE MOON, OR THEIR WORKS.

It is an interesting question to consider (although its discussion can only be understood by practical astronomers), whether if the moon be inhabited, we are ever likely to discover from the earth any symptoms either of motion or works of art in proof of this important and curious question. Some continental astronomers have at times announced discoveries of lunar roads, buildings, and cultivated fields; but, from the known telescopic powers which these observers possessed, and, indeed, from what any astronomer has yet been able to use, those fancied works would be so prodigious in their dimensions before they could be seen at all, that we remain sceptical in this country of such appearances having become visible. The likelihood, however, of such things being seen with more perfect instruments, is another matter; and there appears at least no improbability, much less *impossibility* in it. A telescope capable of showing us living creatures or their works on the moon, would not be nearly so wonderful in these enlightened days, when new and wonderful inventions are constantly making, as our present optical instruments would have been to the sages of antiquity, the wisest of whom must at first have ascribed them entirely to magic.

The best plan for succeeding in this object, was formerly thought to be by increasing the size of the mirrors of reflecting telescopes, in order that more luminous images might be formed, which could bear to be more highly magnified. Herschel's great telescope is 40 feet of focal length, and its mirror is 4 feet in diameter;[*] but this last was found in practice incapable of being used with good effect, owing to the proportions of the instrument. We have accounts of this astronomer having applied magnifying powers of several thousands; but one of two hundred is about the highest which he could have really used on this telescope to see any thing distinctly.[†]

Mr. Ramage's largest telescope at Aberdeen is 25 feet in focal length, with a mirror of 15 inches in diameter. He finds that 9 inches of diameter exposed in this reflector is sufficient for general purposes, as in viewing the moon; for, more of it being exposed, pains the eye of the observer, and he cannot bear above 4 inches of it when looking at the sun. When the whole mirror is used to this body, so intense is the heat in the focus, that it has melted the steel of a watch spring, and cracked the glasses which concentrated the rays. It appears to this excellent astronomer (whose reflecting telescopes are made by himself), that the best means for greatly increasing their power with real effect beyond what has yet been done, is to construct telescopes of a much greater focal length in proportion to the diameter of the mirror, than that of the large reflector of Sir William Herschel. A greater magnifying power would thus be obtained, and a distinctness of vision unattainable in instruments of great diameter and short focal length. For instance, with a focal length of at least 100 feet, and a mirror of 3 feet, the image could be enlarged 16 times beyond what could be done with the same mirror if its image was concentrated from only a 25 feet focus, and the image would also bear to be greatly more magnified, because it might be more directly viewed. The heat from a larger mirror than is used at present would not be increased in proportion to its size, but be lessened by the extension of its focus.

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[*] Herschel's mirror is far from being perfect in its form, as it is almost impossible to produce a perfect figure on a concave mirror of so large a diameter and short focal length; even were it quite correct in this respect, still, from the obliquity with which he viewed the image, the magnifying power can never be great in order to produce distinct vision.

[†] See Dr. Pearson's Astronomy.

I am sure that all scientific men will be highly gratified in reading an account of the means proposed for effecting so wonderful a discovery in Mr. Ramage's own words, in a communication with which he has favoured me, from which the following is an extract:—"The superiority of telescopes of long foci over those of short in the minutiæ of astronomy is great. The image of the object by these instruments being large, only requires an eye-glass of small curvature. Objects are thus seen more distinctly, more naturally, and with greater ease than when viewed with telescopes of short foci, which require glasses of very deep curvatures to produce the same magnifying power. If, then, the moon, for instance, can be seen so distinctly with a telescope of 7 feet focus, which gives an image scarcely 1 inch in diameter (and with one of this size Sir W. Herschel made some of his greatest discoveries), what may not reasonably be expected from an instrument that would produce an image 22 inches diameter, or show the moon's surface on a scale of an inch to a hundred miles!"

Such an undertaking, however, would be found too expensive an experiment for the unaided effort of a private individual, unless fortune was added to ardour and talent; but Mr. Ramage has offered, if he were assisted with the means, to use his utmost endeavours to accomplish what would be the greatest of all modern discoveries—a proposal well worthy the attention and support of every lover of science and liberal views. We rejected the offers of Columbus, to discover a then unknown portion of the globe, and another nation bore off the honour of finding out what was called a new world; but our ascertaining by actual sight of the natives or their works, that the moon is an inhabited globe as well as our own, would far surpass the famed discovery of America. Although we could hope for no commercial or other relations with them—for none of their gold and silver, or precious commodities to us as yet even unimagined, still we should feel ourselves more convincingly inhabiting only one of the many vast peopled mansions in the interminable space of the universe. Little else would then be thought of in our learned societies, but conjectures as to the nature and advancement in knowledge of the inhabitants of other worlds. Although we could not in our present bodies leave the earth to make their acquaintance, yet our minds, or, in other words, *our souls*, would bound in idea to visit them: astronomy would take the lead among earthly amusements and assume a new feature ; countless observatories would rear their huge tubes of inspection to gratify the learned and the curious. Who would not claim to be included among the latter ? Even common opinion would then probably have no hesitation in peopling every sparkling orb which we see, although it is past the utmost bounds of human hope, that men as now constituted, shall ever by any contrivance extend such a visual discovery beyond their own attendant moon.

HYMN ON THE STARS,

BY MRS. HEMANS.

"Child of the earth ! Oh ! lift thy glance
To yon bright firmament's expanse ;
The glories of its realms explore,
And gaze, and wonder, and adore !

"Doth it not speak to every sense,
The marvels of Omnipotence ?
Seest thou not there the Almighty name,
Inscribed in characters of flame ?

"Mark well each little star, whose rays
In distant splendour meet thy gaze ;
Each is a world, by Him sustained,
Who from eternity hath reigned.

"Each, kindled not for earth alone,
Hath circling planets of its own,
And beings, whose existence springs
From Him, the all-powerful King of kings.

"Haply, those glorious beings know
No stain of guilt, nor tear of woe;
But raising still the adoring voice,
For ever in their God rejoice.

"What, then, art thou, oh! child of clay!
Amid creation's grandeur, say?
E'en as an insect on the breeze,
E'en as a dew-drop, lost in seas!

"Yet fear thou not!—the sovereign hand,
Which spread the ocean and the land,
And hung the rolling spheres in air,
Hath, e'en for thee, a Father's care!"

Note.—It ought to be noticed that the celebrated astronomer Herschel, so famous for his great reflecting telescopes, and the numerous important discoveries made with them, has been in this treatise sometimes called Dr. Herschel, and at other times Sir William Herschel, which may confuse, as to the person meant, those who are not aware that he was best known as *Doctor* Herschel before he was made a Baronet. His son, the present Sir John Herschel, has also devoted his talents to astronomy. They may be called, indeed, an astronomical family, for a sister of the Doctor's used to aid him in his observations, and even made many discoveries herself, finding out several comets, and being her brother's chief assistant and calculator in forming a catalogue of 50,000 stars. It may be added, that the study of these worlds in the air has not unfitted this lady for sublunary concerns, as she now amuses herself by presiding over a dairy of 80 cows in Hanover. They were much noticed by George III. who frequently visited their observatory at Slough, near Windsor. Sir John has lately gone out to the Cape of Good Hope for astronomical purposes.

ERRATUM.—*For* 1500 in note on page 123, *read* 1300.

THE MUMMY AWAKED.

THE MUMMY AWAKED;

A POETIC CONTRAST

BETWEEN

THE KNOWLEDGE OF THE ANCIENT EGYPTIANS
AND THAT OF MODERN TIMES:

BY

ALEXANDER COPLAND, Esq.

ADVOCATE.

THE MUMMY AWAKED.

I.

Look up, dark Mummy; you're among the living,
Who fain would hear your antiquarian lore;
If breath you have, strange tales you might be giving
Of what befel on Nilus' banks of yore,
Before your eyelids felt death's cheerless sleep;
Or must you still his secrets closely keep?

II.

You had at Thebes a far fam'd wide Necropolis,[1]
Where kings and queens lay wrapt in rich perfume,
Did not your dead once make it their metropolis,
When you were laid in strangely painted room?
Are you aware that you're again in light,
That waking eyes may stare at such a sight?

III.

Is this the likeness of your living face,
So quaintly carv'd upon your coffin lid?
It has not quite our lineaments of grace,
But what was grace with you from us is hid:
Ev'n now grace differs in each diff'rent clime,
What did the beaux think of it in *your* time?

IV.

How did they spice you into an immortal?—
And yet 'twould little serve us if you tell;
For as you are, you'll never reach heaven's portal,
So dust to dust perhaps is just as well:
Unless the soul be caught before it start,
But this I fancy was far past their art.[2]

V.

Embalming now is little cared about,
And bodies decompose as is their nature;
Yet now we know that all shall hear the shout
Which is again to give man form and stature!
Without the slightest aid from gums or spices;
Then happy they who here took good advices.

VI.

What wast thou, Mummy, in thy waking day,
  Before they laid you in this painted box?
What do these mystic hieroglyphics say?
  Something, I doubt, that's not quite orthodox.
Or were they only meant to tell your history,
Without a word of dark and heathen mystery?

VII.

Perhaps you were a nut-brown laughing maid,
  With rosy lips and eyes so sweetly beaming;
Have courted been, and heard what lovers said,
  With downcast glance so modest and beseeming;
But now your heart is hard and lies as still
As it had ne'er been warm or had a will.

VIII.

You may have waited upon Pharaoh's daughter,
  Who now would little have been known to fame,
Had she not taken Moses from the water;—
  Perhaps you may have been that very dame.
Were you one whom the Hebrews "spoil'd" at parting,
By borrowing gold and silver just at starting?

IX.

Could you like us transmute old rags to gold ?
Or circulate bank notes for solid treasures ?
For paper money merchandise is sold,
But sometimes we see cause to change our *measures.*
Why were ye all deluded by your priests,
To worship reptiles, birds, and senseless beasts ?

X.

But better far these learned fathers knew,
And Eleusinian mysteries could explain ;(3)
Yet these were but expounded to a few,
And we now try to fathom them in vain.
On Portland's mystic urn (4) perhaps we see
Their secret figur'd, but we can't agree.

XI.

Did you know Moses and the Hebrew nation ?
Had they left off the trade of making bricks
Before you sunk down from your earthly station,
To dwell awhile upon the banks of Styx ?
Heard you the sea did o'er proud Pharaoh flow,
In chasing Israel, though he bade them go ?

XII.

We now sail o'er the main where'er we will,
A little needle pointing out the way;
And if our sails the winds refuse to fill,
We make hot water drive us through the spray!
Earth, sea, and air are subject to our wishes,
We ev'n go down and walk among the fishes!

XIII.

In diving bell 'neath the deep sea we glide,
Sit there at ease, or splash about a while;
Foretell eclipses and each rising tide—
Did'st ever take a walk beneath the Nile?
Or think the moon when she's at such a distance,
Could on this globe draw seas without assistance?

XIV.

Your barks requir'd the wind to cleave the deep,
Or wretched rowers toiling at the oar;
But now we only stir the fire to keep
Our steamers wheeling o'er from shore to shore.
Through tempests ev'n they dash with govern'd power,
Rattling along at full ten knots an hour.

XV.

We now have men above the clouds who rise,
  Tied to a bag, for gold, or ev'n for flattery;
With hempen string bring light'ning from the skies! (5)
  Or rouse the dead by a galvanic battery! (6)
Were gas and steam known to your fam'd magicians,
Had you such folks as lawyers and physicians?

XVI.

We can show magic, but we call it *natural,*
  Because from Nature's laws its wonders spring;
You'd not believe this if you saw the half of all
  Which we perform without the wand or wing
Of any great enchanter of renown—
Indeed, real demon arts are wholly flown.

XVII.

Great ships far west must sail upon the brine,
  And brave the hurricanes of tropic seas,
While others eastward cross earth's middle line,
  And reel through typhoons (7) for strange China's teas,
Before ev'n washerwomen now sit down,
To break their fast in country or in town.

XVIII.

The richest freights our largest ships bring home,
  Are wither'd leaves in many a varnish'd chest;
Or to the western world our merchants roam
  For other leaves, in thousand hogsheads press'd:
We sip the first—the second grind to snuff,
Or burn them as tobacco for a puff!

XIX.

Though warriors still fight with the sword and lance,
  Yet hostile chariots now no more engage,
Though gallant horsemen still in battle prance,
  They're not so potent as in earlier age;
For weak arms now can lay the strongest low,
And unseen hands oft deal the deadliest blow!

XX.

We bend a finger, or apply a spark—
  Swift as a flash then speeds the fatal ball;
Nor human strength requires to reach its mark,
  And now by Parthian shafts few foemen fall.
Some messengers of death don't weigh an ounce,
Others as eight-and-forty pounders bounce!

XXI.

Great heroes still delight in reckless slaughters,
And *glory* now is found 'mid fire and smoke.
The brave deserve the fair, and so our daughters
Oft catch the scarlet fever past a joke.
You may not see exactly their connexion,
But you shall learn, if under good direction.

XXII.

When hostile city sends its final "No"
To foe who means to play the deuce within;
We need no battering ram for shattering blow,
For three miles off great balls we can throw in!
Spring mines beneath which eyes blast in their sockets,
Or rain down fire from shells and Congreve rockets!

XXIII.

We angle now for fish of sixty feet;
Huge monsters round the polar icebergs swimming;
And cut them up for light in house and street;
But gas now saves of many a lamp the trimming.
Still longer far than whales, though we ne'er struck it,
Is the sea-serpent which swims off Nantucket.(8)

XXIV.

You labour'd hard recording deeds and learning
On blocks of granite, and sepulchral chambers;
But long, men's eyes gaz'd without much discerning,
Amidst these wrecks where peering *Sçavan* clambers;
Knowledge and news now spread fast by diurnals,
By Penny Magazines and Chambers' Journals.

XXV.

Engines and intellect are both advancing
More rapidly than I can stop to tell;
Learning's bright rays are now more clearly glancing,
Than e're in former age from heaven they fell.
I wonder what such gallopings portend,
And almost fear the world is near an end!

XXVI.

There is an island in the northern seas,
With ships and colonies and commerce gay;
Which raising once disputes about some teas,
A distant land no longer would obey.
Her children there now own no king's dominion,
Yet none are greater—in their own opinion.

XXVII.

But be this as it may, their parent rose
  Like giant in his strength though single handed;
The world allied against her, fear'd to close,
  And firm she stood the shock of nations banded.
She rul'd o'er ocean, scatter'd foes as sands,
And when they came not, sought them in their lands.

XXVIII.

Her merchants once were princes, now forlorn—(9)
  Their house in Leadenhall may soon be LET
To be a granary stor'd with foreign corn,
  That fields at home a long repose may get.
Her far-fam'd colonies shall soon be *free*
To raise no sugar for our cups of tea.

XXIX.

Our land has got what we call wooden walls;
  But these swim here and there upon the brine:
They're mann'd by those who best can play at *balls*,
  And fight like bull-dogs when in battle line.
Britons are free, and slavery must not be,
Except with our defenders on the sea.

XXX.

We dare not buy for slave a blackamoor,
Or else there's some would soon kick up a racket;
But yet the man amongst us who is poor,
The strong may steal, if he but wears a jacket!
Then whip him cruelly, lash'd to a grating,
If he but try to run—the service hating.(10)

XXXI.

Literature means letters rang'd in cunning way;
And twenty-six are all yet we have got:
Still, more than figur'd symbol they can say,
And every tongue they readily denote.
Our children now know more at infant schools
Than your fam'd priests with all their secret rules.

XXXII.

O! many a goose now gives the learned a quill,
Their knowledge and their names abroad to tell.
Your granite records show more patient skill,
But we on leaves can hand down things as well.
Each beau and belle can now disclose love passions
On sheets of foolscap, or describe the fashions.

XXXIII.

Some women now whole volumes even can write,
But then they give up the domestic needle.
You'd be astonish'd what your sex endite,
Since you were only taught to dress and wheedle.
But men fight shy of those who cannot sew,
And few would marry now a down-right *Blue*.

XXXIV.

While you were closed up in your dusty cell,
You've lost a deal of poetry and prose:
Of Sacred Records now, I will not tell,
But they most grave, important things disclose.
My verse is far too light—but what is needful,
You yet shall hear—if you will listen heedful.

XXXV.

Authors and authoresses now come out,
Like moths and butterflies, to live their hour;
But on the shelf they light to look about,
And few to fly again retain the power.
We praise those most who best can strike the lyre on,
As Homer, Virgil, Tasso, Scott, or Byron.

XXXVI.

And there are critics, too, like dragon flies;
Roaming about for whom they may devour;
An author oft by their sharp biting dies,
But others show fight with superior power.
Be gentle, flies, to this my little barque,
Nor sting me like mosquitoes in the dark.

XXXVII.

Seldom I've sought to court the Muses' charms,—
Have woo'd them faintly, with but little skill;
Yet joys have found in their deluding arms,
When toiling up life's steep and weary hill.
Descending now, I careless hear these maids
Inviting back to their Pierian glades.

XXXVIII.

They've broken here the thread of my discourse,
So I must join it like a careful spinner,
And weave my web, which will be none the worse,
Before we leave the shuttle for our dinner.
Dinner, to you! I fear is now a mockery,
But still you might admire our table crockery.

XXXIX.

We have found out beyond the western sea,
Another world with men and women, too ;
But how these got there first, surprises me,
For that they sprung from Eve is surely true.(11)
Old as you are, 'twas long before your time,
I have no doubt, they left their native clime.

XL.

You held the earth a wide unbounded plain ;
But we have reached the east by steering west :
And now can prove the land and heaving main
Form a vast globe which never lies at rest :
Turns as it flies in orbit round the sun,
Which keeps his place, though he appears to run.

XLI.

Tremendous floods and earthquakes on this ball,
Have alter'd much the sea, and eke the land,
Since disobedience caus'd our parents' fall,
From paradise, which they left hand in hand,
To labour for their bread, and spread their race,
Whose rout of journeying now we cannot trace.

XLII.

Your lore was trac'd on rolls of the papyrus;
  And only deep ones tried to write or read,
But all those volumes which you see are near us,
  Were stamp'd from types with an amazing speed!
For twopence now learn'd treatises we sell,—
But you must know of what we cannot tell.

XLIII.

About the shades, perhaps, or heavenly regions,
  Which now we peer for through our tubes and glasses;
O! if one ghost would stray from those bright legions,
  Whose joys we've heard all pleasure here surpasses,
We'd do our best to thank him for his journey,
And all he says shall be ta'en down by Gurney.

XLIV.

(For fast as gossips' talk runs on his pen,
  And few can write short-hand so vastly clever),
If you've seen other worlds and go again,
  Whisper the way before you're off for ever;
And we will follow when we can get ready—
Or is it best to wait here and be steady?

XLV.

Will you believe that men can now espy
  The very mountains of the changeful moon ?
Two rings round Saturn, and some belts which lie
  On Jupiter, and it is likely soon
We'll see some signs of lunar art, by prying
Through the long tube which Ramage speaks of trying.(12)

XLVI.

We can restore clear sight to aged eyes,
  To thread a needle, or find out a star ;
Aye, stars in thousands which your wisest wise
  Could never see, they are so wondrous far ;
We ev'n make maps of the lunarian ridges,
And stare at dancing microscopic midges !

XLVII.

Your obelisks perhaps their shadows threw,
  To teach you when to breakfast or to dine ;
But we make wheels and pinions show as true
  When we should take our coffee or our wine.
We've liquid-silver, measures all heat's rangings,
And prophecies the weather's stay and changings !

XLVIII.

A mail-coach on a turnpike lately pass'd
For the perfection of all locomotion;
But roads of iron from a furnace cast,
Now bear self-moving trains beyond your notion,
Fleeter than dromedary ever travell'd—(13)
What *can* come next, time has not yet unravell'd.

XLIX.

Our ancient gothic must be new to you—
The mouldering stones of many a moss-clad wall
Were in their quarries when you bade adieu
To upper earth, and closed your eyes on all.
Your gardens of delight then sweet and green,
Have pass'd away as they had never been.

L.

Egypt no longer flourishes in pride;
In catacombs her Pharaohs seem to slumber,
With all their nobles pack'd up side by side,
And slaves and minions in a countless number.
Their palaces lie ruin'd in the sand,
All desolate by an Almighty hand!

LI.

But there are walls remain, which show what they
  Could do, and columns still hold up their heads;
Astonishing all those who pass that way,
  To view the ruin Time's dread passage spreads.
Alas! 'tis sad to know how much in vain
Man builds on earth, for down all falls again.

LII.

Who did the pyramids of Geeza raise?
  Which are the theme of many a wise conjecture.
Their founder's name remains with other days,—
  What was the purpose of such architecture?
Who took the pains to carve the massy Sphynx?—
What! are you silent yet, you ancient mynx?

LIII.

Has your light spirit from its mansion fled?
  Could no embalming cheat it here to stay?
Where roams the soul when the cold heart lies dead?
  Does it fly far when lifeless sinks its clay?
Does it feel cold, or heat, or need a lodgement,
Or wish its body back before the judgment?

LIV.

Again you've come to earth, no shadowy form,
  For bone and flesh thou art, and hast a tongue.
Corruption scarce has tried yet to deform
  Thy earthly part,—can nought then now be wrung
From thee to tell us what thou once hast seen—
O that your tongue could whisper what you've been!

LV.

Here you are safe, and inmate of a college,
  As an especial fav'rite of its sages;
So you may soon be deep in modern knowledge,
  And hear of all that has been done for ages;
But if you still can't get out *yes* or *no*,
We'll call some other time,—then, must we go?

THE MUMMY'S REPLY.

I.

Mighty Osiris! where now have I got?
Am I still lingering in the world below?
Is this Elysian life, or is it not?
Who are those strangers staring at me so?
How came I here, ye black-rob'd Magi,(1) say?
Is this a house to rest me on my way?

II.

Jupiter Ammon! do I live or dream?
Who could have thought on such a scene at rising?
If dream it be, it sure must be a gleam
Of other times, most strange and most surprising!
I'll send, on wakening, for the wise to read it,
If then they think me sound enough to heed it.

III.

I much suspect I've left the earthly plain,
  On which I liv'd with others long ago:
And now am somewhere else, to ne'er again
  Look back where Nile's refreshing waters flow.
Is it yet known whence comes that mighty river,
Whose source our tourists thought was hid for ever.

IV.

On earthly things no more can I rely,
  But love to hear the changes which have been;
My breast no longer now can heave a sigh,
  And as a dream I think on what I've seen.
Our sorcerers could rods to serpents change,
But your magicians must have powers more strange:

V.

Our pyramids you ask about, were rais'd
  By one—confound him—I've forgot his name:
But little was his memory with us prais'd,
  For thousands sunk in raising him to fame.
Does not his statue (as I've seen it) stand
On the top still, o'erlooking all the land? (2)

VI.

But many of your questions I must pass,
At least at present, yet if I remember,
We'll talk them over sometime, though, alas!
My tongue's no longer such an active member,
As when in former days I laugh'd at gloom,
For now 'tis parch'd as if by the simoom,(8)

VII.

I dare not tell the secrets of the dead,
But you shall know them all yet, by and bye;
Besides—I've really got an aching head,
And feel a little queerish as I lie;
As if it was my spirit only spoke,
And I have not got *spirits* yet to joke.

VIII.

But you have told me much, I must allow,
So I shall also try what I can say
About what I have seen, but not all now,
And fain would ask some questions, if I may;
I feel so curious several things to know,
And then I'll doze away an hour or so.

IX.

Is Solomon and all his glory gone?
  Is Tadmor in the wilderness still gay? (4)
Have I my native Memphis to bemoan,
  Where thoughtless pass'd the morning of my day?
Does Babylon the great look proudly still,
Or does it now prophetic threats fulfil?

X.

Do any ships from Tarshish hither sail?
  Do Tyre and Sidon still hold rule at sea,
Or is it but in old tradition's tale
  They flourish, who were once so great and free?
From eastern lands they made a mighty din,
To savage islands where they went for tin.(5)

XI.

Of these I here a story strange may tell,
  Which once a skilful mariner told me,
Who knew them well, and swore some potent spell
  Had sunk the nearest where no eye could see!
The waters wild flow'd where it once had been,
And salt waves dash'd where hills and vales were seen.(6)

XII.

Some mountain tops remain'd above the tide,
  And soon to ruggid rocks were wash'd and worn,
Which fatal were to many a vessel's side,
  When night had hid them from the light of morn.
Beyond these Cassiterides (7) there lay—
What no adventurous voyager could say.

XIII.

But to return—I'd keep awhile awake,
  To hear how needles show roads on the main:
Yet I am doubtful if I ought to take
  All this for true, and that you know when rain
Means to come down before its clouds arise,
Or that young sight can lighten glimmering eyes.

XIV.

Show me some wonders! raise your rods and call
  Some spirits from the deep or from the sky!
Touch my poor frame, and make my body all
  Just as it was before grim Death stood by.
If you can do but this, then I'll believe
That you can all which you have said achieve.

XV.

Beardless Magicians! are ye mortal men?
If so, ye cannot 'neath the waters live:
Or rise into the air though e'er so fain—
Powers such as these some God, at least, must give.
But now I feel so hoarse, you must excuse,
If I should cease to speak to give you news.

XVI.

And I, of old, in Haram was confin'd,
For fear I'd smile on others than my lord,
So even if I could call all to mind
Which then took place, 'twould little light afford
To such as you, who know so much already—
So teaze no longer a just waken'd lady.

As the Author's belief regarding the state of the departed—that is, as to the fate or condition *of the soul or mind* during death, may be misunderstood from an expression in the first stanza of the Mummy Awaked, it may be as well to point out that the reference is merely to the eyelids—to the long insensible rest of the embalmed body—not to any supposed torpidity or insensibility of the soul, which, he has no doubt, experiences a life of conscious pleasure or pain in its separate or middle state in Hades, while awaiting there the judgment of the last day, previous to its re-union with the body (when changed into an immortal nature) and its then entrance into heaven or hell, both as properly so called, or as commonly understood. He may add, that although he refers to *a middle state*, yet he no more believes it to be one of *purification*, or of a purgatorial nature, than the most orthodox Protestant, but strictly as represented by the Scriptures, according to the interpretation of the ablest Protestant Theologians.

The state of death, when spoken of as applicable to the bodily frame, refers to mere inanimate matter; when the soul is alluded to, it only is meant as separated from its earthly dwelling, retaining its consciousness and all the mental faculties.

This meaning is the more necessary to be here clearly understood, as the Author has written a Work on the subject, in which the continued consciousness of the soul in a middle state between death and the great and only known judgment, is proved at considerable length, as clearly revealed by divine authority.

NOTES

TO

THE MUMMY AWAKED.

1.

You had at Thebes a far fam'd wide Necropolis.

Stanza ii. line 1.

The Νεκροπολεις, or cities of the dead, as they were termed, were in many instances more extensive than those of the living, beneath which they were sometimes excavated, and often tier below tier. Mountains were preferred when near.

2.

Unless the soul be caught before it start,
But this I fancy was far past their art.

Stanza iv. lines 5 and 6.

At a late unrolment of the cerements of a mummy at Surgeon's Hall, in London, the operator, in a lecture on the subject, mentioned that embalming arose from "the belief of the Egyptians, that, if the soul could be kept within the body for at least 3000 years, it would be entitled to enter the regions of eternal felicity; but if once it left the body, then it would wander about, passing continually from one body to another, according to the doctrine of the metempsychosis." This, however, would not have been their cause for endeavouring to preserve the corpse. We have no evidence that the Egyptians thought they could, by any means, retain the immortal spirit in its lifeless habitation, and we have reason to believe they held that the soul passed immediately after death to the dominion of Pluto. The Lecturer himself, indeed, stated, towards the conclusion of his discourse, that "the origin of this process was the notion of the Egyptians that a time would come when the soul will *again be united with the body*, and therefore that they were bound to preserve the latter in as complete a state as possible for human means to accomplish"—certainly the more probable reason of the two.

See the *Morning Herald* of 17th Jan. 18[illegible]

3.

And Eleusinian mysteries could explain.

Stanza x. line 2.

These are thought to have been intended to inculcate a belief in another state of existence after the present, and a judgment on entering into it.

4.

On Portland's mystic urn perhaps we see
Their secret figur'd, but we can't agree.

Stanza x. lines 5 and 6.

The most beautiful and valuable relic of remote antiquity as a work of art, and, in the opinion of many, the figures on it are clearly emblematic of the immortality of the soul, and a judgment after death.

5.

With hempen string bring light'ning from the skies!

Stanza xv. line 3.

Alluding to the electric kite of Franklin, by which he brought down lightning and put it into a bottle! or, in more philosophic language, charged a Leyden jar with it. The fluid has been made to ring a bell to tell when it is coming! But such dangerous experiments have sometimes proved fatal to the philosopher, as in the case of Professor Richman. The Author's father was once struck down in this way, but the lightning at the time was weak, and he soon recovered.

6.

Or rouse the dead by a galvanic battery!

Stanza xv. line 4.

The effects of galvanism on a recently-dead body are well known. The Author has seen such a body, when galvanized, start up—its eyes open and glaring, while its muscular powers seemed to be so strong as to require considerable force to control its actions.

"But soul was wanting there."

7.

And reel through typhoons for strange China's teas.

Stanza xvii. line 4.

Dreadful storms of wind sometimes experienced in the Chinese seas, which blow with tremendous fury, suddenly shifting to all points of the compass.

8.

Still longer far than whales, though we ne'er struck it,
Is the sea-serpent which swims off Nantucket.

Stanza xxiii. lines 5 and 6.

"When asking Captain Alleyn, in a jocular manner, one day, if [illegible] had ever met with any man who pretended to have seen the [illegible] rise to have his serious reply. [illegible] all my crew.' He then stated [illegible]urning from Batavia, and was [illegible]ng, [illegible] shore of Long Island, when he saw, in broad day, an object on the surface of the sea, about a mile from the ship, which at first he supposed to be a whale. On taking the glass, however, he at once discovered it to be totally different. The head lay flat, with a snout, rather under the surface of the water; the back was arched, and the knobs of the vertebræ quite distinct; the tail was long and tapering; the end about three feet broad, and the position horizontal. It attracted the notice of every man as he came on deck; and Captain A. as well as his crew, had all been accustomed to laugh at the story of the serpent.—For a full half hour they contemplated the monster; and computed its length at about 100 feet. As they neared it, the animal got into motion, first towards the shore, and then, making an immense sweep, and leaving a wake, as Captain Alleyn said, like a frigate, it disappeared, leaving the water in a state of commotion. I find also that the serpent was seen by the packet ship Silas Richards, about five years ago, off Nantucket; and Mr. Orr, one of our passengers, informed me, that an acquaintance of his was on board, a man who was particularly incredulous of wonders, but who readily concurred in the certificate signed upon the subject."

Fergusson of Woodhill's Notes on Canada. 1833.

9.

The two following verses connected with the subjoined note, were omitted in their proper place :—

In war we pray'd for peace, and when it came,
The sun of plenty shone faint through the gloom:
Then we believ'd our rulers were to blame,
So swept th' Augean stable with a *Broom* :
And having lost our pilot in war's storm,
The people gave the helm to Lord Reform ;

Who guides us now, and steers the ship with skill,
And boasts, though peaceful, he could clear for action ;
But yet we grumble, as man ever will,
And ev'n *the Commons* don't give satisfaction ;
Although they vote 'gainst bribery and corruption,
These still burst forth like lava in eruption.

The difference between divine and human prophecies are, that the first are generally communicated at a time when their fulfilment is extremely improbable, and sometimes even when they appear impossible; yet they, nevertheless, invariably prove true, sooner or later; whereas, those of man are always founded on what seems to the prophet as the most likely thing to happen from present circumstances; which, indeed, sometimes leave no doubt as to what must follow; and yet such predictions very seldom, if ever, come to pass exactly as anticipated, if at all. The more confident we are of the future from our own penetration, the more signally, at times, are our prophecies falsified by events; still, we go on in our predictions without any abatement of opinion in our own wisdom.

A strong example of this may be referred to, where the Edinburgh Review, in 1812, only re-echoed the then universal belief as to the consequences of *peace*, which was held by every one as synonymous with *plenty*, past all doubt. Let us compare the prophecy with the fulfilment, which will afford a useful lesson to those who do benefit by experience:—

"The imagination is lost in contemplating the immense increase of our exports which must instantaneously follow the cessation of hostilities between France and this country. In what unheard of —what unimagined abundance must our goods not burst into the markets of the world! It is hard to say whether the land, or the manufacturers, or the population of the empire would gain most by this happy change. Every man in trade, or possessed of any income connected with trade—every landed proprietor, and all those depending on land—every manufacturer and his dependants—in short, all the industrious and proprietary classes of the community, including a great proportion of the professions trading on skill and not on capital, would be greatly richer than they now are; while, at the same time, every consumer, that is, every person in the country, would find that the same money went a great deal further in the purchase of every article of use. A man who now has £500 a-year would have £600, and would live the same way as formerly for £300 instead of £400. He would save, by the year, £300 instead of £100, to provide for his family, and increase his income at compound interest; or he might indulge himself and family in this proportion. *This is as undeniable an effect of peace, as any consequence deduced by mathematical demonstration*"!!!

The actual result.—"Immediately after the last war, a crisis in the affairs of men necessarily occurred. The peace threw thousands, either altogether or in a great measure, out of employment. The articles which labour produced were many of them not further required; and the demand for, and the price of, the remainder, were reduced by the death of the war monopoly, and the great reduction in the naval and military departments. Agriculture and commerce continued for some time to languish, while the spirit of the farmers began to droop, and those of the manufacturers to ferment. In the minds of some men, evils, under the impression of misfortunes, produced discontent; with others, the transition from their former artificial affluence, to a condition which made them feel their real position, broke out into invectives against the measures of government, and into a declared indifference to their country."

M'Grigor's British America. 1833.

10.

Then whip him cruelly, lash'd to a grating,
If he but try to run—the service hating.

Stanza xxx. lines 5 and 6.

Our festive boards resound with the song which assures us that "*Britons never shall be slaves*"—yet we often find this is not altogether provided for by the laws of the land. An armed party is sent out through the streets by our Government, to request the company *instanter* of any one who may suit their fancy in the shape of a sailor, or a little like one; a man, perhaps, just returned from a long voyage, and hastening home to a fondly-expecting wife and children, wholly depending upon him. Such a free-born Briton may be knocked down with impunity, and then desired to stand up to hear that his own consent to servitude is nowise necessary—thrown like a felon into a boat—confined for a while in the hold of *the Tender*—drafted into a ship of war, and, as the anchor is heaving, ordered to join in the chorus of "*Britons never shall be slaves*"! Soon in blue water, he learns that he is bound for a distant and unhealthy station, to remain for a number of years, if he lives as long, and be exposed to all the sad chances of battle. If he gets impatient of hard service, and sighs for home, so much as to escape—and be retaken; he is tried—sentenced to receive 500 lashes through the fleet; having suffered them, he is sent to the hospital-ship, where, while festering in a hammock, the sound of the Admiral's band may reach him, assuring him, on the authority of sheep-skin and wind instruments, that "*Britons never shall be slaves*" !!! This species of kidnapping and slavery, combining the worst features of negro thraldom, with the *advantage* of a cat-o'-nine-tails having the power to give several hundred lashes instead of blacky's thirty-nine, was very lately held quite legal and necessary by a "reformed Parliament," who, if they had determined to give higher wages to our hard-worked and gallant seamen, with a rather different proportion in the distribution of prize-money between the officers and common sailors (somewhat, in short, less difference than between several thousands and one), with more prompt payment, would soon have rendered impressment altogether unnecessary.

11.

For that they sprung from Eve is surely true.

Stanza xxxix. line 4.

But very much disputed, and, from the physiological facts pointed out by the learned in these matters, it is clear that *climate* alone could not have produced the differences which we see among the nations of the earth.

12.

We'll see some signs of lunar art, by prying
Through the long tube which Ramage speaks of trying.

Stanza xliv. line 6.

Alluding to a proposal made by this celebrated practical astronomer, for ascertaining if the moon be really inhabited; and this by acquiring a higher magnifying power from using reflecting telescopes of much greater focal length in proportion to the diameter of the mirror. See "*Other Worlds*," p. 156.

13.

Now bear self-moving trains beyond your notion,
Fleeter than dromedary ever travell'd—

Stanza xlvii. lines 4 and 5.

On the Manchester and Liverpool Rail-road a self-moving carriage called the Rocket has gone at the rate of 40 miles an hour. The common rate is now 15 to 20 miles, and yet so steady and equable is the motion, that passengers are scarcely sensible of its extreme swiftness.

"THE Pantechnicon* possesses a rich treat to the lover of antiquities in an Egyptian Mummy divested of all its bandages, and which is in a much finer state of preservation than any which has previously come before our notice. With the exception of three or four of the fingers and toes, which appear to have been removed by accident, the body is perfect in all its parts, the hair remaining on the head apparently of its natural colour, whilst the teeth and ears are as perfect as those of any living person. The preservative effect of the singular process of embalming is seen to very great perfection, all the muscular parts being changed to a substance resembling tanned leather. A small portion of the bandage in which it was enveloped remains on the left knee, and the impressions on various parts of the body are likewise discernible. From the incision under the left side, it would appear that this Mummy was embalmed according to the superior process, as described by Herodotus, in which the body was disembowelled and its interior filled with precious spices. There are also marks apparently of leaf gold on various parts of the body, from which it is evident that this was formerly one of the kings or priests of the country. It is altogether a very interesting exhibition, there being nothing the least offensive to the most fastidious delicacy, and cannot fail to convey an interesting moral as the mind glides down the stream of time through three thousand years, and contemplates the endless mutations that have taken place in times, nations, and opinions." The Town Newspaper, April 6, 1834.

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* An immense establishment in London, where almost every thing is sold.

NOTES

TO

THE MUMMY'S REPLY.

1.

How came I here, ye black-rob'd Magi, say?

Stanza i. line 5.

It would appear from this that the learned Professors of the University alluded to in the preceding, were present in their gowns at this interesting interview.

2.

Does not his statue (as I've seen it) stand
On the top still, o'erlooking all the land?

Stanza v. lines 5 and 6.

There is such a tradition in Egypt.

3.

For now 'tis parch'd as if by the simoom.

Stanza vi. line 6.

A hot wind from the desert, often very fatal, but soon blows over. Those caught by it cover their faces and keep them close to the sand. The very camels are conscious of their danger, and use a similar precaution. It has a slight tinge of purple, but a sight of it costs very dear. See Bruce's Travels in Abyssinia.

4.

Is Tadmor in the wilderness still gay?

Stanza ix. line 2.

Unrivalled once in extent and magnificence, Tadmor is now but ruins and rubbish; the few mud huts of the Bedouin Arabs forming a sad contrast to the superb remains of the marble temples among which they are reared. The city (if it can now be so called) is named *Thedmor* by the Arabs to this day—a word originally derived from a Hebrew root, signifying a palm tree, and it is known to us as Palmyra, but not a tree remains of its extensive groves, and all around is one vast desert of sand. The fame of its founder still flourishes among its scattered fragments after nearly 3000 years, but its greatest splendour is believed to have been about the beginning of the Christian æra, and to have ended in our third century, when it was taken by the Romans. "All these mighty works," said an Arab once to an English traveller, "Solomon, the son of David, raised by the assistance of spirits."

Babylon and Tyre are reduced to much the same state as Palmyra. On the site of Sidon (now called Seide or Said) there still stands a city of a noble and picturesque appearance from a little distance, but its interior is gloomy and wretched, retaining very few traces of its ancient grandeur or importance. The gardens around its dilapidated walls, however, are still very beautiful. Its population is about 7000. See Wilson's Travels in the Holy Land. Vol. II. pp. 74-9.

5.

To savage islands where they went for tin.

Stanza x. line 6.

Now called the British Islands.

6.

The waters wild flow'd where it once had been,
And salt waves dash'd where hills and vales were seen.

Stanza xi. lines 5 and 6.

There is an old tradition in Cornwall, that a great extent of land sunk in the sea, off what is now called the Land's End, of which the Scilly islands and rocks are said to have been formerly a part. The sea, too, has been long, and still is, gradually encroaching on the land there.

The flats (some of them dry at the ebb of spring tides) which stretch from one of these islands to another, are plain evidences, indeed, of a former union subsisting between many now distinct islands. On these sand banks (over some of which there is more than 12 feet water), walls and ruins are frequently discovered at low tides by the shifting of the sands. History confirms their former union. "The isles of Cassiterides," says Strabo, "are ten in number, close to one another; one of them is desert and unpeopled, the rest are inhabited." The sea has now multiplied them to 140; and yet there are but six inhabited. The isle of Scilly, from which the little cluster of these cyclades takes its name, is no more at present than a high rock of about a furlong, over whose cliffs none but wild goats climb, and whose barrenness will not support any inhabitants but sea birds.

These islands were once celebrated for the trade which they carried on in tin with the Phenicians, Greeks, and Romans, at which time they were fertile, and well peopled. There are very slight remains now to be seen even of tin mines on any of the Scilly islands. Although part of the tin so anxiously sought after by the nations bordering on the Mediterranean has probably come from Cornwall, yet the records of ancient authors show that the above named islands principally supplied it. The story of the Phenician vessel, mentioned by Strabo, to have purposely run on shore, and risked the men as well as lost the ship, rather than discover to the Romans the trade to these isles, is well known, and proves, beyond all doubt, the commerce with them to have been very advantageous. That the natives had mines and worked them, appears from Diodorus Siculus, Lib. V. c. 2. and from Strabo Geog. Lib. III. who informs us that Publius Crassus sailing thither, and observing how they worked their mines, which were but of little depth, instructed them how to carry on this trade to better advantage. The plain inference from these circumstances and intimations must be, that the tradition still held by the natives, of a vast extent of land having been overwhelmed by the sea, is founded in fact.

See Carew's Survey of Cornwall.—Camden.—
Philosophical Transactions, 1753.—Cornish
Geological Transactions, Vol. II. p. 131.

7.

Beyond these Cassiterides there lay—
What no adventurous voyager could say.

Stanza xii. lines 5 and 6.

Or Tin Islands; so called by the ancients.

FINIS.